4.2 SAFETY

This section addresses potential upset conditions during Project construction and operation that could result in release of oil or hazardous materials, fire, explosion or other conditions that could be hazardous to the public and environment. Detailed analyses of impacts of upset conditions on specific resources are addressed in their respective sections (e.g., Section 4.6, Marine Biological Resources).

Potential safety effects of the proposed Project and potential Alternatives are based on a change from existing conditions. Significance criteria are used to assess the significance of the impacts, and whether MMs can be applied to reduce the level of significance.

This section relies upon information contained in the South Ellwood Field Emergency Action Plan (EAP), the California Department of Fish and Game (CDFG) Office of Oil Spill Prevention and Response (OSPR) Area Contingency Plan for Region 4, Los Angeles/Long Beach, and Venoco's Emergency Action Plan and Fire Prevention and Preparedness Plan. It also incorporates by reference the conclusions of the EMT EIR regarding hazards associated with operation of the EMT and summarizes these where appropriate. Where this document relies upon MMs contained in the EMT EIR to address Project impacts, these are summarized to permit report reviewers to understand their relationship to the Project and included in their entirety in Appendix H.

4.2.1 Environmental Setting

Scope of the Safety Analysis

Assembly of information presented in this section involved a review of PRC 421 production facilities by licensed structural and petroleum facility engineers to address the adequacy and ability of these facilities to operate safely throughout the life of the proposed Project. The assessment of the physical integrity of primary existing and proposed facility components serves as the basis for analyzing the potential hazards of resuming production from PRC 421. The engineering assessments incorporate existing conditions and facility improvements implemented by Venoco since 1997 and further improvements proposed as part of this Project. The facility engineering assessment is provided as a technical report in Appendix C.

Existing Conditions

The proposed Project would utilize a number of existing facilities integral to historic PRC 421 operations and involve upgrades to some of these facilities, new construction, and use of, but not alteration to, existing Ellwood area oil production facilities currently in operation, such as the EMT and components of the EOF and Platform Holly (Figure 4.2-1). Most of these existing facilities were originally constructed in the late 1920s or early 1930s. As a result, the age of these facilities and their ability to support continued oil and gas production safely has been a focus of agency attention and public concern regarding the safety and potential impacts of recommissioning PRC 421 (see comments on the Notice of Preparation [NOP] in Appendix B).

Project piers and caissons were subject to structural engineering review in 2000 (Thomas and Beers 2000). That report assessed the condition of the existing caissons and noted that construction plans were unavailable to fully identify construction characteristics and provide support for detailed structural engineering review. The report also disclosed that corrosion had collapsed the upper reaches of the seaward-facing portions of both caisson walls in the early 1980s and that both seaward-facing walls had been subject to major repairs completed in approximately 1985. The report concluded although it was "impossible to know for certain if the caisson islands have adequate structural integrity" that the caissons have survived 50 years of inclement weather and that the repairs completed in 1985 appear to be in good condition and that it appeared likely that sound engineering and design had been used in these caissons along with "robust" construction. As discussed below, four years after completing this assessment, major portions of the previously repaired seaward-facing wall on Caisson 421-1 collapsed during a severe weather event.

Since Venoco's acquisition of the lease, both PRC 421 and some Ellwood area facilities have undergone rigorous inspection and review by regulatory agencies, and Venoco has implemented a series of upgrades and improvements. These improvements have been designed to repair degraded or failing facility components and to correct potential safety deficiencies. In particular, major improvements were performed on the Project piers incorporating the detailed engineering recommendations of the Thomas and Beers report.

The proposed Project would not require physical changes to the EMT, but would create an additional source of crude oil throughput at the terminal. Similarly, the Project would use the EOF for support functions (control-room functions, security, and power); the physical change to the EOF would be limited to the installation of the power cable for operations through the life of production, approximately 12 years.

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Project Facilities and Functions

FIGURE 4.2-1

Sensitive Receptors and Populations in the Project Area

A variety of land uses exist in the immediate vicinity of the Project site that could be affected by upset conditions including areas of recreational, commercial, and residential development. As a result, a number of populations could be impacted by potential upset conditions, including patrons and employees at the Sandpiper Golf Course and the Bacara Resort and populations living or working in the area including the Devereux and Ellwood schools, the UCSB's West Campus and Married Student housing, Francisco Torres Dormitories, and the Grove Condominiums; and Ellwood and Santa Barbara Shores neighborhoods along Hollister Avenue east of the site. In addition, users of the local beaches, trails, and ocean could also be impacted. (Refer to the EMT EIR for additional details on population densities and distances from EMT facilities.) Further, the shoreline in the vicinity of the piers includes sensitive resources and habitats that could be affected by Project activities, including biological, cultural, historic, and archaeological resources (see resource-specific sections for a discussion of impacts from upset conditions). Sensitive sites in the area are identified in the Area Contingency Plan (ACP) for the Los Angeles Long Beach region (ACP 4). The ACP contains site-specific resources, response considerations (e.g., seasonal factors, access points, and hazards), as well as protective strategies and logistics (CDFG and U.S. Coast Guard [USCG] 2005; accessed 10 October 2006). Maps of these sites are included in Appendix C.

Historical Activity and Relation to Proposed Project

As discussed in Section 2.0, Project Description, the Project area has been used for oil and gas production since 1928. Currently, Federal, State, and local lands are used for on- and off-shore oil and gas production. There are 19 existing platforms on the Federal Outer Continental Shelf (OCS) and 20 fields in State tidelands (Minerals Management Service [MMS] 2006; CSLC 2006b).

Operational and abandonment practices associated with early oil and gas development were less protective of the environment than modern practices and requirements and, as a consequence, present conditions may have unknown or unquantified oil-related contamination as a result of earlier developments. Further, the adequacy of the abandonment of production wells in the area is also an issue of concern, with at least 20 of the 72 wells drilled into the reservoir from offshore piers having potential deficiencies in their abandonment procedures (CSLC 2006c).

As described in Section 2.1.1, Project History, PRC 421 was shut-in in 1994 in response to a leak in the 6-inch pipeline which delivered oil to Line 96. Since the facilities were

shut-in, additional problems have occurred, including methane and oil leaks at both piers PRC 421-1 and 421-2, as well as the partial collapse of the Caisson at 421-1. These issues and activities at PRC 421 relevant to this safety analysis are described below:

1994 Pipeline Leak – A release of 170 barrels was caused by a leak in the 6-inch pipeline. The pipeline is presently out of service, but would be used in the proposed Project as an outer "casing" for two new flow lines that would be inserted into the 6-inch line. The proposed repair of the damaged portions of this pipeline and removal of 90 degree bends, along with installation of a new leak detection and automated shut-off (on the well) on the existing pipeline would in part serve to resolve the conditions that led to the release.

Methane Leak in 2000 and Repairs – As noted previously, detection of the leak during inspection triggered a series of repairs and upgrades to PRC 421 facilities, which included the wellhead, well casings, and installation of surface and subsurface safety valves. Prior to implementing these repairs, both piers were largely reconstructed, the seawall was strengthened by the addition of riprap, and the access road was resurfaced and upgraded. Historic production equipment was removed from the piers.

PRC 421-1 Pier Damage, 2004 – The seaward-facing wall of the caisson at Pier 421-1 partially collapsed into the surf during severe winter storms in 2004. In response, Venoco instituted emergency repairs to the caisson wall. Similar repairs are proposed for PRC 421-2. The structural integrity of and any needed improvements to the caissons at piers 421-1 and 421-2 is an important question addressed in this EIR.

According to the South Ellwood Field EAP, none of the Ellwood area oil production facilities, including the PRC 421 facilities, has had a reportable spill reaching marine waters in over 10 years (Venoco 2005).

Existing Facility Conditions

Existing facilities at PRC 421 have undergone structural improvements, repairs, and removal of historic structures. The present conditions of these facilities, as they relate to safety of the proposed Project, are summarized in Table 4.2-1. Hazards, conditions, or features that have the potential to be the source of a release, fire, or explosion, are also noted. Figure 4.2-2 shows the piers in their existing condition, and Figure 4.2-3 shows the conditions of the existing caisson walls of each pier.

Table 4.2-1. Summary of Facility Conditions

Facility	Condition
PRC 421-1 Pier and Caisson	Pier was reinforced in 2000 along with repairs to the well casing and wellheads. Subsurface safety valves were installed. A new seaward-facing wall was installed on the caisson in 2004. The three remaining walls appear to be of original construction. Venoco has developed and is implementing a monitoring plan to identify and respond to leaks from the PRC 421 piers. The pier is fenced and patrolled twice daily by private security.
PRC 421-2 Pier and Caisson	The pier was reinforced and upgraded in 2000. The caisson has not been repaired or upgraded and shows signs of degradation and wear consistent with an older structure exposed to the marine environment. Subsurface safety valves were installed in 2000. Venoco has developed and implemented a monitoring plan to identify and respond to leaks from the PRC 421 piers. This facility is likely to have similar source and quantity of contaminated material as that found in PRC 421-1. The pier is fenced and patrolled twice daily by private security.
6-inch Pipeline	In 1994, 170 barrels of oil were released near the coastal bluffs. The line is currently out of service and is not suitable for modern "pigging" maintenance due to the presence of two 90 degree bends.
Access Road and Seawall	The access road was reconstructed and resurfaced during 2000 repair activity to permit use by heavy construction equipment. The seawall was expanded and reinforced by the addition of new riprap; however, there is a gap in the seawall between Piers 421-1 and 421-2 where a timber bulkhead provides the only protection for the access road. Security patrols along the access road are conducted by Venoco.
EOF (control areas)	The EOF control areas, integral to the Project, do not have notable conditions related to Safety. Substantial upgrades to the EOF have been implemented to comply with the 1999 Santa Barbara County APCD Abatement Order and conclusions of the 2000 quantitative risk assessment and Safety audit (Santa Barbara County 2006).
Line 96 (tie-in to EMT)	Under current operation. Leak detection system is a SCADA-type system[1]. A rupture would be expected to be detected and isolated within 5 minutes. The pipeline is hydrotested per regulatory requirements; the 2002 hydrotest of Line 96 passed (CSLC 2006a).
EMT	Under current operation and subject to regular inspections of the tanks, loading lines, and other facility oil storage and transfer components. Mooring system overhauls and cathodic protection systems checks are conducted annually (CSLC 2006a). The two 65,000 barrel storage tanks were repaired in 2006 to replace the corroded floating roofs. The loading line is periodically exposed. Hydrotests of the loading line in 2005 indicated the line passed (CSLC 2006a). Safety-related mitigations are proposed for the facility in the 2006 Draft EIR, noted later in this section.
Barge Jovalan	Single-hulled barge with maximum capacity of 56,000 barrels. Conversion or replacement of barge Jovalan with double hull by 2010 is proposed as mitigation in the 2006 Draft EMT EIR. The barge has been periodically out of service in 2006 to permit repairs due to a vapor leak caused by damaged deck plate and also due to minor collision with another vessel (Santa Barbara County 2006).

[1] SCADA is a supervisory control and data acquisition system and is in common use for leak detection. See discussion in Section 4.2 of the Draft EMT EIR (CSLC 2006a).

Figure 4.2-2a
PRC 421-1 Pier

Figure 4.2-2b
PRC 421-2 Pier

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Existing Conditions of the
PRC 421 Piers

FIGURE
4.2-2

Figure 4.2-3a
PRC 421-1 Caisson Wall (facing ocean)

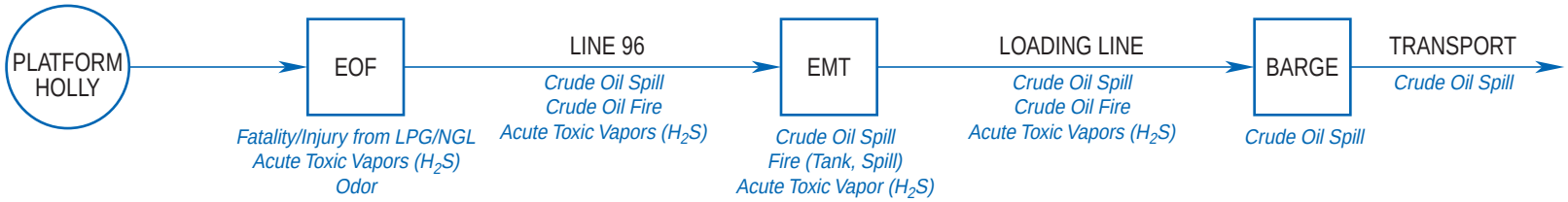
Figure 4.2-3b
PRC 421-2 Caisson Wall (facing ocean)

Existing Facility Hazards

Of the Project components solely associated with PRC 421 operations, Pier 421-2 represents the predominant existing hazard. Although the pier is secured and monitored, and not currently producing oil, its current condition is similar to that of PRC 421-1 prior to its partial collapse and emergency repair. Further, sands within and possibly beneath both caissons may contain unknown quantities of residual oil and oil-containing materials. In their current condition, portions of either caisson, particularly the older seaward facing wall of 421-2, could deteriorate and release oil and oil-related contaminants.

Hazards and hazardous conditions associated with the other Ellwood area oil production facilities, specifically the EOF, EMT, and Line 96, would be affected by implementation of the proposed Project as it would increase total crude oil throughput at these facilities. The EOF, EMT, and Line 96 have been evaluated in other assessments, which contain individually proposed mitigations that have either been implemented or are in progress. The 1999 Abatement Order by the Santa Barbara County Air Pollution Control District (APCD) required a series of audits, improvements, and other actions to address emissions of gas containing hydrogen sulfide (H_2S) (Santa Barbara County APCD 1999). Although the Abatement Order notes PRC 421 as being included in the Ellwood facilities, there were no specific references to PRC 421 in the Abatement Order. The Abatement Order led to the preparation of a quantitative risk assessment of these facilities (Arthur D. Little [ADL] 2000). The conclusions of the quantitative risk assessment are incorporated in this EIR both as background for issues affecting the proposed Project and for use in assessing the risk associated with certain Project alternatives.

The Ellwood area oil production facilities have hazards and risks associated with them related to the crude oil produced from Platform Holly, for which crude oil production includes H_2S or “sour gas.” Crude oil with little or no H_2S content is referred to as “sweet” crude. Figure 4.2-4 is a simplified diagram presenting existing hazards and risks associated with the Ellwood area oil production facilities that would be affected by the proposed Project. These are the baseline conditions against which Project effects have been compared. The information about hazards and risks were obtained from existing reports and analyses (CSLC 2006a; ADL 2000).



LEGEND

Existing Facilities

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Baseline Hazards/Risks from Ellwood Oil Production Facilities

FIGURE 4.2-4

The hazards and risks associated with Ellwood facility components are summarized below (see the Draft EMT EIR for a full discussion):

- **EOF** – The Project would not require use of the EOF for separation, processing, or treatment of oil. The Project would use the EOF for control-room and security support, and for electrical power (from the substation). These facility elements do not have specific hazards associated with them relevant to this evaluation.

- **Line 96** – Regarding the potential for release of crude oil (leak or rupture) and consequent potential for injury from exposure to toxic vapors (related to H_2S content of the crude produced from Platform Holly), the estimated likelihood of a spill over the next 10 years, under current operating conditions, ranges from 6.2 percent (pipeline rupture) to 30 percent (pipeline leak). Crude oil ignition and associated potential for thermal impacts, while present, are considered to be low.

- **EMT** – There is a potential for release of crude oil from tankage and loading lines and potential for crude oil fires. The estimated spill frequency from EMT loading lines over the next 10 years, under current operating conditions, ranges from 0.1 percent (rupture on land) to 82 percent (small leak in ocean). Risks associated with exposure to toxic vapors from a crude oil spill (related to H_2S content) and thermal radiation from a crude oil fire are estimated as being within the Santa Barbara County Safety Element acceptable risk; in part this determination is related to the likely limited presence of persons being near the EMT or loading lines at the time of a spill. Refer to the EMT EIR for full discussion of impacts associated with operating the EMT for an additional 10 years under a higher "permitted" throughput of crude oil.

- **Barge Jovalan** – Potential for release of crude oil during loading and transportation of crude oil under current conditions ranged from spill probabilities of 0.01 to 21.8 percent[1]. Marine oil spills could occur during loading, at the EMT, or in transit to refineries in Los Angeles or San Francisco. See the EMT EIR for a full analysis of impacts associated with operating barge Jovalan for an additional 10 years under a higher ("permitted") throughput of crude oil. The EMT EIR identifies nine potentially significant safety impacts associated with extension of the EMT lease; all but one of these, release of crude oil into the marine environment, are identified as being subject to feasible mitigation (Class II).

Crude Oil Characteristics

Crude oil characteristics can vary significantly by origin and (after exposure to the surface) weathering. At the wellhead, crude oil is typically a mixture of water, hydrocarbons (liquid and gases), solids, and natural gas. The crude oil produced from

[1] Probabilities are expressed as percent likelihood of occurrence over the 10-year life of the project under evaluation. The lowest probability (0.01 percent) relates to spills greater than 2,381 barrels (100,000 gallons), and the highest probability (21.8 percent) to spills less than 0.02 barrel (1 gallon). For a more detailed explanation and summary of spill rates, refer to Section 4.2 of the Draft EMT EIR (CSLC 2006a).

PRC 421 is "sweet" crude, referring to its low sulfur and H_2S content. Table 4.2-2 provides the crude oil properties of oil produced from PRC 421 (Ellwood Field), compared to other crude oils produced from the South Ellwood Field (Platform Holly) and transported from the EMT.

Table 4.2-2. Crude Oil Characteristics, PRC 421 and the South Ellwood Field

	PRC 421	Holly[a]	EMT[b]
API Gravity	35	22.4	22.4
Sulfur Content, percent by weight	<0.6%	Not available	4.1%
H_2S Concentration, ppm	10[c]	200	65

[a] EAP fact sheets, Venoco 1998. Crude oil currently stored and transported at the EMT is that produced at Platform Holly and treated at the EOF.

[b] Santa Barbara County 2002.

[c] Venoco 2004.

The natural gas content of oil produced at PRC 421 is known to be low, and the gas that is produced would have an H_2S content of approximately 10 parts per million (ppm). The low gas content of this oil was confirmed during previous production under emergency permit by Venoco in 2001 when approximately 17,000 barrels of oil produced from 421-2 contained no detectable amounts of gas (Venoco 2007). The Emergency Response Planning Guidelines (ERPG), which are used to develop thresholds for injuries and fatalities, identify 30 ppm of H_2S as being the level at which nearly all individuals could be exposed for up to one hour without experiencing irreversible or serious health effects (American Industrial Hygiene Association 2006). Therefore, the crude oil that would be produced by the proposed Project would not be a source of acute toxic impacts to human receptors, if released. This distinguishes the characteristics of oil produced from PRC 421 from that currently being transported in Line 96 and through the EMT.

When crude oil is released into the environment, it can pose a range of hazards, depending on the specific properties of the crude oil, location, and condition under which it is released, and the sensitivity and physical characteristics of the receiving environment and local receptors. Crude oil can be toxic to biota, as well as cause physical harm or death to animals following contact with oil. See Section 4.5, Hydrology, Water Quality, and Water Resources for discussion of effects of oil on water quality, and Section 4.6, Marine Biological Resources for more discussion about the effects of oil on biota.

Rapid response to a crude oil release is critical. Because crude oil contains a mixture of constituents, as the lighter or more volatile fractions dissipate, the remaining material is thicker and tends to be more persistent in the environment if it is not contained and

removed at the early stages of a response. Crude oil spilled in the marine environment typically forms an emulsion that incorporates sand and debris as it weathers, which causes it to sink after a period of time and is difficult to recover. This is especially true of oil in the surf zone, which is a high-energy area.

Crude oil can ignite, which could result in a crude oil fire. As noted in the Draft EMT EIR, the likelihood of an explosion related to a crude oil spill and fire is "virtually non-existent;" therefore, the EMT analysis did not conduct further analysis on explosions (CSLC 2006a; ADL 2000).

Environmental Hazards

The Project site is situated in a dynamic environment, with naturally occurring conditions that may affect safety conditions. These are ocean/wind conditions, coastal processes, seismicity, and subsurface pressure in the EOF. See Section 4.1, Geologic Resources for a complete discussion of geologic processes that may impact safety conditions of the proposed Project; specifically erosion, seismicity, tsunamis, and subsurface pressure.

Ocean/Wind Conditions

Prevailing winds in the coastal region are from the west/northwest during the day, with an average speed of 7 to 12 miles per hour. Evening winds blow from the east, as the air over the Pacific Ocean cools and creates a low pressure zone. Ocean conditions are summarized below, and are described in more detail in the Draft EMT EIR. This data is based on historic conditions in the Project area, and it is uncertain to what degree, if any, these would evolve or change due to the effects of global warming over the approximate 12 year Project production horizon.

Although located in the relatively sheltered surf zone of the Santa Barbara Channel, the Project site is subject to periodic high winter surf conditions. Heavy winter storms can generate wave heights in excess of 10 feet leading to scouring of all or most of the sand from beaches at the Project site and exposing primary Project facilities, such as the caissons, piers, and seawall to battering from heavy surf. When combined with winter high tides which can reach the toe of the seawall, such high surf conditions may pose a hazard to Project facilities.

Table 4.2-3. Ocean and Wind Conditions – Percent Frequency

Weather Elements	Annual Average	Monthly Maximum
Wind > 33 Knots	1.3	2.2
Wave Height > 9 feet	6.4	10.6
Visibility < 2 nautical miles	6.3	8.7
Precipitation (inches)	16.8	5.8
Temperature > 69°F	1.7	4.2
Mean Temperature (°F)	58.8	62.8
Temperature < 33 °F	0	0.1
Mean Relative Humidity (percent)	82	86
Overcast or Obscured	31.4	50.6
Mean Cloud Cover (8ths)	4.5	5.4
Prevailing Wind Direction	NW	0

Sources: USCG 2002; CSLC 2006a.

Security, Prevention, and Response Capabilities for the Ellwood Facilities

Venoco has existing security, accident prevention, and response capabilities that specifically address the PRC 421 facilities. Preventive measures, plans, response equipment, and the programs required to implement a response (e.g., health and safety training, drills and exercises, and equipment inspection) contribute to Venoco's ability to prevent or respond to upset conditions. Most of these measures and programs are governed by agency and industry requirements and standards (see Section 4.2.2, Regulatory Setting), as well as corporate policies, to avoid or reduce harm to the public and the environment. Although these safeguards provide a level of confidence in the safety of operations, and an ability to respond to emergencies, they cannot reduce the potential for accidents or harm to zero. Existing security, prevention, and response capabilities in place that specifically encompass PRC 421 facilities are listed in Table 4.2-4.

For releases of oil at the Ellwood facilities, Venoco has response equipment, vessels, personnel, and/or supplies located at the EOF and Ellwood pier. As required by various regulations, contingency plan implementation requires personnel training, equipment testing and inspections, and scheduled and unscheduled drills and exercises to maintain readiness. According to records provided of response drills and exercises held for the Ellwood facilities since 1999, 10 drills were held, of which nine were for H_2S releases or H_2S-related drills at the EOF, and one was an unannounced oil spill drill at the EMT, initiated by OSPR. None of the drills specifically addressed PRC 421. According to the records provided, some included written evaluations by Santa Barbara County, providing specific recommendations (Venoco 1999-2004).

Table 4.2-4. Security, Prevention and Response Plans and Capabilities In Place for PRC 421 Facilities

Measure	Purpose
Controlled Access	Each caisson has an 8-foot-high chain link fence that remains locked to prohibit entry to the equipment on the piers. EOF staff provide security.
Security Patrol	A private security firm patrols the PRC 421 facility area twice daily.
Emergency Action Plan (EAP)	Emergency plan for the South Ellwood facilities provides information and procedures for emergency shutdown, evaluation, and response to emergency conditions at the South Ellwood Field. The plan includes procedures for responding to and managing an oil spill emergency, and contains response checklists, roles and responsibilities of response personnel, inventories and locations of response equipment, supplies, and personnel (Venoco and contracted).
Spill Prevention Countermeasures and Control (SPCC) Plan	Description of systems (equipment, containment, related components) at PRC 421 used to prevent and manage releases of oil.
Fire Prevention and Preparedness Plan, South Ellwood Facilities	Fire prevention and response. This plan specifically addresses the EOF and EMT. PRC 421 facilities are not specifically addressed in this plan.
Mitigations from 2006 MND[1]	Site-specific plans resulting from PRC 421-1 repair and subsequent monitoring for leakage which are under preparation and were completed in early 2007: • Emergency Response Plan • Prevention and Control Plan • Removal Action Plan

[1] These plans are mitigations developed in the 2006 MND by the City of Goleta (City of Goleta 2006a). As of April 2007, these plans have been submitted to the County Energy Division.

The EAP includes descriptive information of and response procedures for PRC 421, referred to in the plan as the "Beachfront Lease." The existing contents of the EAP list the historical components and note that they will be replaced. Similarly, the Spill Prevention Countermeasures and Control (SPCC) Plan would need to be updated as it lists a potential release volume of 900 barrels; however, the source of the volume noted was the crude oil storage tank on PRC 421-1, which has been removed. On-water containment procedures in the EAP include booming strategies for a release from the piers.

The EOF and EMT have engineered fire protection systems and procedures (contained in the Fire Prevention and Preparedness Plan) to prevent, detect, and manage a fire. According to the Fire Prevention and Preparedness Plan, Venoco personnel are trained

and equipped to initiate a response to a fire at the incipient stage[2] and to control the site in preparation for the arrival of the Santa Barbara County Fire Department. In its existing form, the Fire Prevention and Preparedness Plan does not specifically provide procedures or other information for the PRC 421 facilities (Venoco 2003).

4.2.2 Regulatory Setting

Many State and Federal laws and regulations govern marine terminals, vessels calling at marine terminals, security, and emergency response/contingency planning. The primary regulations that pertain to the proposed Project are summarized below.

International Maritime Organization (IMO)

The IMO is the major body governing the movement of goods at sea and does so through a series of international protocols. Individual countries must approve and adopt these protocols before they become effective. The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78 and amendments) governs the movement of oil and specifies tanker construction standards and equipment requirements. Regulation 26 of Annex I of MARPOL 73/78 requires that every tanker of 150 tons gross tonnage and above shall carry on board a shipboard oil pollution emergency plan approved by IMO. The IMO has also issued "Guidelines for the Development of Shipboard Oil Pollution Emergency Plans" to assist tanker owners in preparing such plans that comply with the cited regulations and to assist governments in developing and enacting domestic laws that give force to and implement the cited regulations. Plans that meet the 1990 Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (California SB 2040) requirements also meet IMO requirements. Traffic Separation Schemes (TSSs) must be approved by the IMO, such as the approved TSSs at the entrances to San Francisco Bay and the Santa Barbara Channel.

Federal

A number of Federal laws regulate marine terminals and vessels. These laws address, among other things, design and construction standards, operational standards, and spill prevention and cleanup. Key regulations relevant to this Project include:

[2] As defined by OSHA (29 CFR 1910.155[c][26]), an incipient stage fire is in its initial or beginning stage, and can be controlled or extinguished by portable fire extinguishers, class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Oil Pollution Act (OPA) 1990

The OPA of 1990 was enacted to expand prevention and preparedness activities, improve response capabilities, ensure that shippers and oil companies pay the costs of spills that do occur, and establish an expanded research and development program. The Act also establishes a $1 billion Oil Spill Liability Trust Fund, funded by a tax on crude oil received at refineries. A Memorandum of Understanding (MOU) was established to divide areas of responsibility. The USCG is responsible for tank vessels and marine terminals, the Environmental Protection Agency (EPA) for tank farms, and the Research and Special Programs Administration (RSPA) for pipelines. Each of these agencies has developed regulations for their area of responsibility.

All facilities and vessels that have the potential to release oil into navigable waters are required by the OPA to have up-to-date oil spill response plans and to have submitted them to the appropriate Federal agency for review and approval. Of particular importance in the OPA is the requirement for facilities and vessels to demonstrate that they have sufficient response equipment under contract to respond to and clean up a worst-case spill.

Hazardous Liquid Pipeline Safety Act of 1979

Hazardous liquid pipelines are under the jurisdiction of the US Department of Transportation (DOT). This Act includes requirements for accident reporting, design, and construction requirements, and prescribes minimum requirements for hydrostatic testing, compliance dates, test pressures, and duration; test medium; and records. It also specifies minimum requirements for operating and maintaining steel pipeline systems.

40 CFR Parts 109, 110, 112, 113, and 114

The SPCC plans covered in these regulatory programs apply to oil storage and transportation facilities and terminals, tank farms, bulk plants, oil refineries, and production facilities, as well as bulk oil consumers, such as apartment houses, office buildings, schools, hospitals, farms, and State and Federal facilities.

These regulations include minimum criteria for developing oil-removal contingency plans, prohibit discharge of oil such that applicable water quality standards would be violated, and address oil spill prevention and preparation of SPCC plans. They also establish financial liability limits and provide civil penalties for violations of the oil spill regulations.

State

California State Lands Commission (California Code of Regulations [CCR] Title 2, Division 3, Chapter 1)

The CSLC Marine Facilities Division is responsible for regulating and inspecting marine terminals. Through California Code of Regulations (CCR) § 2300 through 2571, the Marine Facilities Division established a comprehensive program to minimize and prevent spills from occurring at marine terminals, and to minimize spill impact should one occur. These regulations established a comprehensive inspection-monitoring plan whereby CSLC inspectors monitor transfer operations on a continuing basis. An inspection is conducted annually, and the EMT was subject to a comprehensive "audit," including underwater and above-wharf structural inspection in July, 1999. The standards generated by the proposed Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) provide specific requirements for subsequent audits and engineering inspections.

California State Lands Commission – Marine Oil Terminal Engineering and Maintenance Standards

The MOTEMS were approved by the California Building Standards Commission on January 19, 2005. These standards apply to all existing and new marine oil terminals in California, and include criteria for inspection, structural analysis and design, mooring and berthing, geotechnical considerations, fire, piping, mechanical, and electrical systems. The purpose of MOTEMS is to establish minimum engineering, inspection, and maintenance criteria for marine oil terminals in order to prevent oil spills and to protect public health, safety, and the environment. MOTEMS do not, in general, address operational requirements. Relevant provisions from existing codes, industry standards, recommended practices, regulations, and guidelines have been incorporated directly or through reference, as part of MOTEMS.

Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, (Oil Spill Prevention and Response Act [OSPRA], 8670 Gov. Code Chapter 7.4)

This Act requires preparation of a State oil spill contingency plan to protect marine waters. It also empowers a deputy director of the CDFG to take steps to prevent, remove, abate, respond, contain, and clean up oil spills. Notification is required to the Governor's Office of Emergency Services, which in turn notifies the response agencies, of all oil spills in the marine environment, regardless of size. Oil Spill Contingency Plans must be prepared and implemented. The Act also created the Oil Spill Prevention and

Administration Fund and the Oil Spill Response Trust Fund. Pipeline operators pay fees into the first of these funds for pipelines transporting oil into the State across, under, or through marine waters. The Lempert-Keene Act also directs authority to the CSLC for oil spill prevention from and inspection of marine facilities (PRC 8750 *et seq*).

California Coastal Act of 1976 (Public Resources Code, Division 20)

The California Coastal Act of 1976 (Public Resources Code, Division 20) created the CCC, with the responsibility of granting development permits for coastal projects and for determining consistency between Federal and State coastal management programs. Section 30232 of the Coastal Act addresses hazardous materials spills and states that "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."

Also in 1976, the State Legislature created the California State Coastal Conservancy to take steps to preserve, enhance, and restore coastal resources and to address issues that regulation alone cannot resolve.

California Pipeline Safety Act of 1981

This Act gives regulatory jurisdiction to the California State Fire Marshall (CSFM) for the safety of all intrastate hazardous liquid pipelines and all interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations.

Overview of California Pipeline Safety Regulations

California Government Code sections 51010 through 51018 provide specific safety requirements that are more stringent than the Federal rules, including periodic hydrostatic testing of pipelines, pipeline leak detection, and requirement that all leaks be reported.

Oil Pipeline Environmental Responsibility Act (Assembly Bill [AB] 1868)

This Act requires every pipeline corporation qualifying as a public utility and transporting crude oil in a public utility oil pipeline system to be held strictly liable for any damages incurred by "any injured party which arise out of, or caused by, the discharge or leaking of crude oil or any fraction thereof...." The law applies only to public utility pipelines for

which construction would be completed after January 1, 1996, or that part of an existing utility pipeline that is being relocated after the above date and is more than three miles in length.

Local

The Santa Barbara County Energy Division has established a number of programs and plans to address oil and gas operations in the county.

System Safety and Reliability Review Committee (SSRRC)

The Santa Barbara County Board of Supervisors originally established the SSRRC in 1985 to identify and require correction of possible design and operational hazards for oil and gas projects prior to construction and startup of the project and for project modifications. The SSRRC has delegated authority to review the technical design of facilities, as well as to review and approve the Safety, Inspection, Maintenance and Quality Assurance Program (SIMQAP) and its implementation (i.e., conduct safety audits, review facility changes, etc.). The city of Goleta contracts with the County Energy Division for energy related planning services, which includes SSRRC project review.

Safety Inspection, Maintenance and Quality Assurance Plan (SIMQAP)

The purpose and scope of the SIMQAP is to identify procedures that will be used during the operation of a facility and to insure that all equipment will function as designed. The SIMQAP identifies items to be inspected, maintained or tested, defines the procedure for such inspection, maintenance, or testing, and establishes the frequency of inspection, maintenance or testing. SIMQAP audits are conducted on facilities to ensure compliance. The last SIMQAP was conducted on the EMT in 2006.

Oil Transportation Plan

The Oil Transportation Plan has determined that pipelines are preferable to marine tankering in terms of air quality, socioeconomics, and risk of an oil spill.

City of Goleta Safety Element

The objective of the city's Safety Element is to minimize risk associated with the operation of Venoco's Ellwood area facilities and other oil and gas operations. As part of this objective and its adopted policies, the city has defined unacceptable risk as involving new development as well as modifications to existing development if those

modifications increase risk. Several city polices address how to minimize or avoid risk from H_2S and pipeline operations and set forth the requirements for preparation of Quantitative Risk Assessments (QRA). Pipeline polices address construction, location, operation, and safety, as well as the location of sensitive receptors in proximity to pipelines.

Santa Barbara County Public Safety Thresholds and Safety Element

The county has established thresholds for classifying the significance of public safety impacts, particularly public exposure to acute risks from activities with significant amounts of hazardous materials. The county defines acute risk as being the "chance of fatality or serious injury due to a single, short-term, involuntary exposure to the release of hazardous gas, liquid, or solid, or to a fire or explosion." The thresholds are designed for use in EIRs as significance criteria. The county's Safety Element automatically requires some types of facilities – such as sour gas pipelines and processing facilities – to perform a quantitative risk assessment to calculate risk and apply the criteria. These criteria were applied for analyses related to the EOF, EMT, and Line 96, which handle sour crude oil that contains higher concentrations of H_2S, which is an acutely hazardous material. Findings from the related QRA for the EOF are discussed where appropriate below (see also Section 4.4, Air Quality).

University Long Range Development Plan (LRDP)

The UCSB LRDP and related EIR discuss potential safety hazards associated with the EMT and note that such safety issues would be substantially reduced by the closure of the EMT and cleanup of the site upon the expiration of its lease with the UCSB. The LRDP anticipates removal of the EMT upon the termination of the current lease in 2016, restoration of the area to conditions approximating the natural habitat values that existed prior to the initial construction of the facilities, and designation of the 17.5 acres as Open Space.

4.2.3 Significance Criteria

A safety impact is considered significant if any of the following apply:

- There is a potential for fire, explosion, releases of flammable/toxic materials and/or oil, or other accidents resulting from Project operations that could cause injury or death to members of the public;

- Operations would increase the probability or volume of oil spills into the environment, and existing or proposed emergency response capabilities are not adequate to effectively mitigate Project spills and other accidents; or

- The proposed Project operations may not be consistent with Federal, State or local regulations. Conformance with regulations does not necessarily mean that there are no significant impacts.

4.2.4 Impact Analysis and Mitigation

This section evaluates the proposed Project construction and operational activity to identify potential impacts and their severity with respect to the stated significance criteria. Activities and conditions that, under upset conditions, could lead to a release of oil or hazardous materials, fire, or explosion were identified based on a review of available materials, site visits, independent engineering and structural analyses, and professional judgment. Impacts were compared against baseline conditions and the significance criteria established in the State CEQA Guidelines and the EMT EIR to determine the severity of the impact. Where relevant, a quantitative estimate of frequency or probability is utilized. Where applicable, MMs have been developed to avoid or reduce impacts. For impacts associated with the Ellwood area oil production facilities currently in operation, baseline conditions were derived from the Draft EMT EIR and other available reports, which were defined earlier in this section.

Construction and operational impacts related to a release of hazardous materials are also discussed in Section 4.3, Hazardous Materials. BMPs which address construction-related impacts (e.g., release of fuel during refueling operations) and potential exposure of the public to hazards during construction are also addressed in Appendix F. BMPs which would address potential construction related hazards would include the presence of monitors to direct public access during construction, installation of temporary fencing as needed, removal of equipment or other hazards from the beach and other publicly accessible areas at the end of each day of construction, the posting of warning signs, etc. The Draft EMT EIR proposes mitigations that are incorporated by reference into this document that would reduce the potential for crude oil releases, and therefore the opportunity for crude oil fires.

Construction Impacts

Impact S-1: Release of Oil During Cleanup of 6-inch Pipeline

Residual oil could be encountered and released during clean up of the 6-inch pipeline (Less than Significant, Class III).

Prior to installation of the 2-inch flow lines within the existing 6-inch pipeline that connects the piers to the Line 96 tie-in, a release of oil could occur. The 6-inch pipeline was the source of the 1994 leak; therefore, residual oil could still be present within or surrounding the pipeline. During construction and the proposed repair of this pipeline, residual material could be encountered. If residual oil is encountered, it could be controlled and removed to prevent further contamination or migration. BMPs would include safety procedures for use of equipment in the presence of hydrocarbons, which would reduce the potential for ignition if vapors are present (see Appendix F). As noted previously, access to the construction area would be controlled to maintain safety and prevent public contact with construction-generated materials or equipment. Therefore, this impact would be adverse but less than significant.

Mitigation Measures

No mitigation is required.

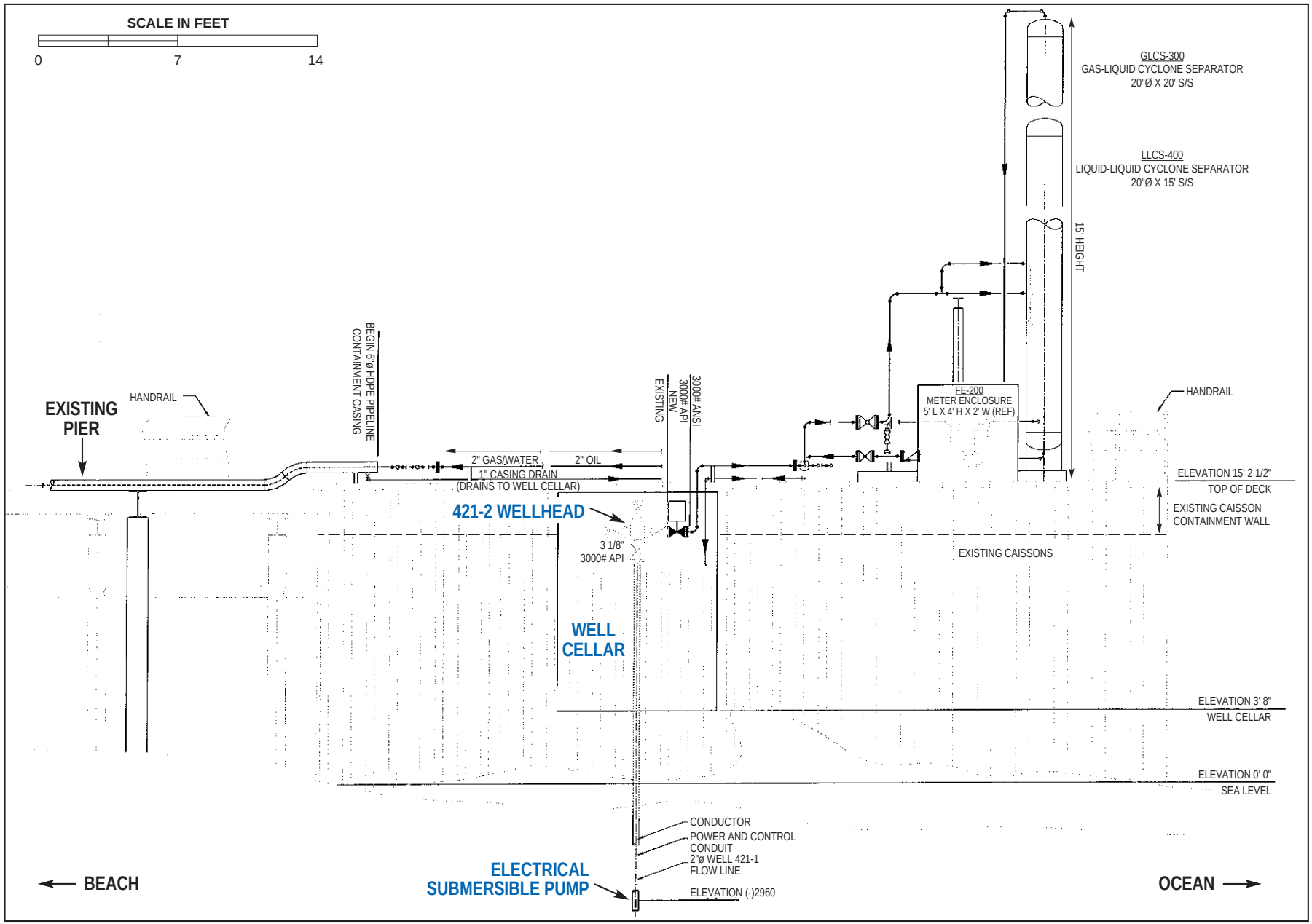
Rationale for Mitigation

As discussed above, BMPs which establish Project construction equipment operation and maintenance procedures are designed to prevent releases, and would also be protective of the public during the construction process to avoid potential contact with hazardous materials and the introduction of ignition sources. Such measures would include removal of equipment and construction materials from the beach at night, use of tape or orange plastic construction fencing around construction areas and the presence of monitors to direct the public around construction activity (See Appendix F).

Impacts From Production on PRC 421-2

The proposed well design and layout at PRC 421-2 is shown in Figure 4.2-5. Some of the critical features include the electric submersible pump (ESP), which would be at a depth of approximately 2,960 feet below sea level, the subsurface safety valve (SSSV) located above the ESP, the well cellar (within the caisson) that has an approximate capacity of 213 barrels (8,946 gallons), the wellhead and casing, surface safety valve (SSV), lines to the separation systems; and the gas-liquid (GLCS) and liquid-liquid (Hydrocyclone) separator.

This closed system would pump crude oil emulsion to the surface and deliver it directly to the gas- and liquid-separation systems on the surface of the caisson. Safety features included in this system are the safety valves (SSSV and SSV) that are “fail-safe” by



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Cross-Section of Proposed Layout for PRC 421-2

FIGURE 4.2-5

requiring power or energy to remain open. If there is a loss in power, the valves shut, which prevents oil from being brought to the surface.

The well cellar within the caisson has a volume of approximately 213 barrels. It is believed to have sand and other materials packed around it, but its actual condition and construction are unknown. The well cellar houses the wellhead and casing and, in the event of leakage, would serve as containment within the caisson, with some improvements likely required to permit these facilities to provide complete containment (see MM S-4b below). The wall surrounding the caisson deck is higher than the deck itself and would in its present state impede oil movement, but is not specifically designed as secondary containment.

The wellhead was repaired in 2000-2001. Under the proposed Project, the wellhead would be equipped with current safety equipment and adhere to design criteria as specified in API RP 14C, *Safety Analysis Function Evaluation (SAFE) of Offshore Petroleum Production Systems*, and incorporated in 30 CFR 250.168.

An engineering review of the existing and proposed facilities and features was conducted to evaluate the appropriateness and adequacy of the Project with respect to safe operations for the Project duration. This technical report is contained in Appendix C. The report included the following observations:

- The Project design uses proven technologies and is consistent with industry standards.
- Installation of an ESP is advantageous because it protects the equipment from external forces (wave action) and avoids creating a noise source on the surface.
- The separators would include pressure safety valves to ensure thermal and fire over-pressure protection.
- The separators, though proven technologies, are not typically used for projects located in the surf zone where they would be exposed to potential wave action. The location of the separators and associated instrumentation at PRC 421 and their exposure to weather and wave action could potentially result in oil and gas leakage.
- The 2-inch flowline would be equipped with high pressure switches for leak detection; however, the design does not currently include a means of detecting low pressure, which would be important if the 6-inch casing were compromised.
- The proposed production equipment and piping has a design pressure of 740 pounds per square inch, gauge (psig). The proposed 2-inch flowline would have a

maximum operating pressure of 415 psig which would exceed that of Line 96 (reported design-operating pressure of 285 psig) and could pose overpressure conditions, which could be addressed by addition of a pressure safety valve (PSV).

As discussed above, a preliminary review of the structural integrity of Project caissons and the seawall was conducted by a licensed structural engineer to determine the current structural stability of key Project facilities and to analyze the potential for the facilities to endure over the life of the Project. The review of the structural integrity of Project facilities consisted of:

- A visual inspection of all facilities by a licensed structural engineer;
- A review and analysis of structural diagrams of Project facilities from the 2006 Negative Declaration (ND) and other engineering diagrams and relevant documents which address design standards and construction issues for marine structures such as seawalls;
- Communication and information exchanges with CSLC engineering staff regarding recent improvements at caisson 421-1 and those proposed for 421-2; and
- A review of a previous structural engineering report on the Project piers and caissons (Thomas and Beers 2000).

No as-built plans were provided by Venoco for the seawall and older portions of the caissons and no load calculations were available for the new walls; therefore, the present stability of the piers, caissons, and seawall was impossible to fully ascertain. The concern over the lack of as-built plans mirrored similar concerns raised in the previous structural engineering report (Thomas and Beers 2000).

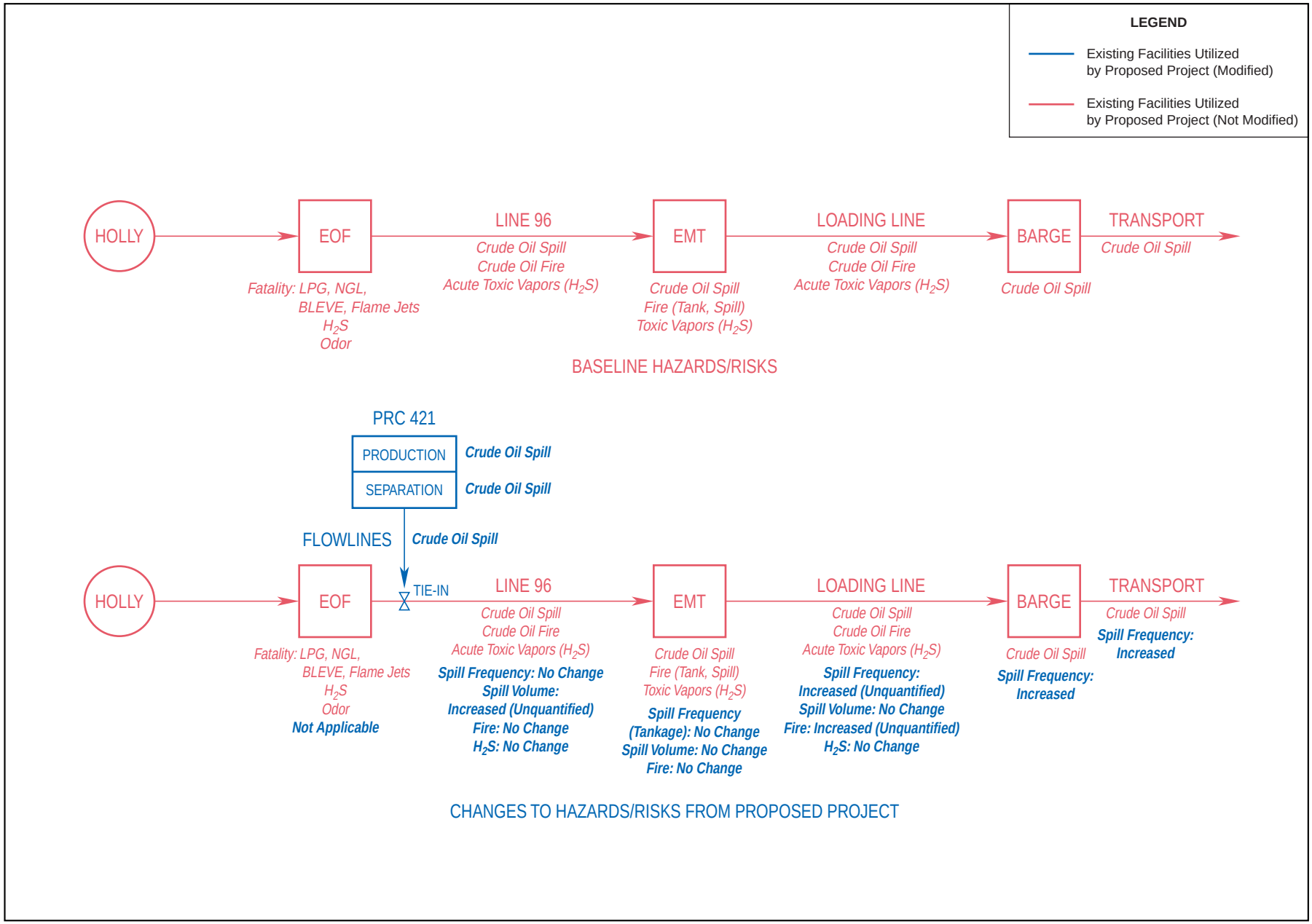
Figure 4.2-6 shows the changes to baseline hazards and risks posed by the proposed Project. The impacts of these changes are discussed below.

Impact S-2: Exposure of the Public and Environment to Safety Hazards Due to Collapse of the 421-1 or 421-2 Caissons

The proposed Project would prolong the use of the aging caissons, which could collapse and lead to the release of hazardous materials and oil from within the caisson or from Project-related pipelines (Potentially Significant, Class II).

Impact Discussion

The Project's aging caisson walls have been subject to over 75 years of weathering and corrosion associated with exposure to the surf zone of a marine environment. While a



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Baseline and Changes to Hazards/Risks

FIGURE 4.2-6

visual inspection of these facilities revealed no major stress lines or cracks, the unprotected seaward facing side of Caisson 421-2 and the sides and rear of both caissons show signs of wear and stress that would be anticipated under such circumstances. This includes a number of smaller cracks and irregularities, one of which appears to very slowly seep oily or sulfurous fluid. In addition, no as-built plans for these aging facilities are available to assist in determining probable structural stability for the 12 years or more of Project operation. Further, review of the existing 421-1 seaward-facing wall and that proposed for 421-2 indicates that earthquake loading appears to not have been considered in the design of these structures. Finally, as noted in the structural engineering report, these structures have suffered substantial collapses of the seaward-facing walls twice in the last 25 years (Thomas and Beers 2000). The collapse that occurred in the 1980s occurred after completion of what were identified as major repairs and inspection by a qualified structural engineer (Thomas and Beers 2000). However, the extent and quality of these repairs is not clearly documented. Under these circumstances, based on the lack of definitive engineering information, the partial collapse of one or both of these aging caissons could occur during the 12 years or more of Project operation, particularly associated with sustained high winter surf, seismic activity, or in a low-probability large wave event. Such a collapse could result in release of unknown quantities of sand contaminated with hydrocarbons into the marine environment, as well as small quantities of oil associated with production at 421-2. This impact would be considered potentially significant and subject to feasible mitigation (Class II).

Mitigation Measures

MM S-2a. Design Review / Wave Loading Evaluation. Venoco shall evaluate the caissons at Piers 421-1 and 421-2 and recommend and design improvements required for the piers to permit them to support Project facilities through at least the anticipated 12-year production life. These improvements shall account for design wave loading conditions including hydrodynamic loading, overturning, and base shear, as well as the maximum credible earthquake according to the UBC. Once included, the revised design plans shall be reviewed and certified by a professional structural engineer and shall be submitted to the CSLC for approval.

MM S-2b. Caisson Improvements. Based on recommendations provided under MM S-2a, Venoco shall construct improvements needed at the 421-1 and 421-2 caissons to insure that the non-seaward-facing walls are reinforced to withstand wave and tidal action and that both caissons receive reinforcement or improvements sufficient to protect these design

wave loading conditions including hydrodynamic loading, overturning, and base shear, as well as the maximum credible earthquake according to the UBC. Prior to recommencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct the necessary improvements to meet the criteria of this mitigation measure.

Rationale for Mitigation

The existing seaward-facing wall on the 421-1 caisson and that proposed for the 421-2 caisson appear adequate to protect the seaward-facing side of these structures from severe winter storm damage; however, data are unavailable to demonstrate the ability of the walls to withstand damage from low-probability, high-magnitude events such as the maximum probable design waves and earthquakes. MM S-2a would require provision of such data, while MM S-2b would require implementation of accompanying improvements as needed. These measures would also require review and potential reinforcement of the non-seaward-facing walls of these caissons, which have not been subject to any recent improvement. Such improvements may include construction of walls similar to those proposed for the seaward-facing walls of the caissons for all non-seaward-facing walls of the caissons to address the potential for failure of these non-seaward-facing walls from both high-magnitude, low-frequency events (i.e., design wave events and earthquakes) and from more typical severe winter storms.

Full implementation of these measures would reduce Impact S-2 to less than significant.

Impact S-3: Exposure of the Public and Environment to Safety Hazards Due to Collapse of or Damage to the Existing Timber Bulkhead or Rip-Rap Seawall

The proposed Project would prolong the use of the existing causeway and supporting, aging timber bulkhead and rip-rap seawall, which would be exposed to high winter surf and large wave events over at least an additional 12 years, leading to possible erosion or collapse and the potential for release of hazardous materials and oil from within the causeway or Project-related pipelines. This

impact would be considered potentially significant and subject to feasible mitigation (Class II).

Impact Discussion

The stability of the existing seawall is difficult to assess because as-built plans were also not available for this structure. In addition, based on previous environmental review of past seawall improvements, it is unclear if seawall construction followed standard Santa Barbara County construction practices for such structures (Santa Barbara County 2001). In particular, it is unclear if the seawall was keyed into bedrock underlying the beach sand to prevent undercutting. This seawall is faced with generally large 1- to 3-ton boulders consistent with standard seawall construction practices in Santa Barbara County. The use of large 1- to 3-ton boulders should provide adequate protection and prevent remobilization of these rocks during larger storm events; however, several gaps exist in the rip-rap portions of this seawall and minor areas have been repaired with smaller sized rock that could become remobilized during high surf events. Further, visual observations of the seawall at the east end of the Project site, between Piers 421-1 and 421-2, reveal that in this area, the seawall consists of the original timber bulkhead which has not been reinforced with rip-rap and thus should be considered as marginally stable. This segment of the wall is partially shielded from some wave action by the 421-1 and 421-2 piers and caissons. As such, it would probably continue to function during small storm events, but an unquantifiable large storm event and associated major wave action could result in total failure of the wall. This is evidenced by the fact that major portions of this historic seawall have suffered collapse and substantial damage over the last decade along other portions of the Ellwood Coast (AMEC 2006). Collapse of this segment of the seawall in a high-surf or low-probability, large-wave event could undermine the Project access road and expose the proposed oil and produced water pipelines and power cables to wave action, creating potentially significant impacts related to the accidental release of oil into the marine environment (Class II).

Mitigation Measures

MM S-3a. Design Review by Structural Engineer. Venoco shall retain a licensed structural engineer to review seawall design and recommend improvements to the Project seawall to permit it to support Project access road, pipelines, and power cables through at least the anticipated 12-year production life. These potential design improvements shall account for anticipated winter surf conditions and for a design wave event. West of Pier 421-1, improvements to the seawall may include use of additional appropriately sized (i.e. 1- to 3-ton boulders) rip-rap if needed to fill in small gaps in the wall. Between Piers 421-1 and 421-2 and east of 421-2, to the maximum extent feasible, any needed seawall improvements shall consists of minor repairs to and strengthening of the existing timber bulkhead, unless seawall design review indicates that such improvements would be insufficient to protect the pipeline and power cables over the estimated 12-year life of the Project. Prior to recommencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct the necessary improvements to meet the criteria of this mitigation measure.

MM S-3b. Pipeline Relocation. Venoco shall relocate the proposed 2-inch oil pipeline to the inland edge of the access road between Piers 421-1 and 421-2 to minimize the potential for damage to these lines associated with possible collapse of the timber bulkhead seawall. Prior to recommencement of production, and subject to receipt of all necessary approvals and permits to undertake the work, Venoco shall construct the necessary improvements to meet the criteria of this mitigation measure.

Rationale for Mitigation

The existing seawall appears adequate to protect Project facilities over most of its length. However, portions of the seawall may require repair and upgrade to ensure that damage to pipelines and other facilities does not occur during winter surf of a design wave event. However, consistent with the intent of city of Goleta policies to minimize new coastal protection structures, MM S-3a would permit only focused repair of minor gaps in the Project seawall, but not the extension of rip-rap into new areas solely protected by the aging timber bulkhead. These areas would be subject to limited repair and strengthening of the aging bulkhead as needed, through repairs to the existing timber bulkhead. The relatively intact condition of this portion of the timber bulkhead and the fact that it is partially shielded from direct wave action by Piers 421-1 and 421-2, would seem to support lesser improvements to this segment. This would be confirmed as part of design review. MM S-3b would provide an added level of protection for the proposed oil pipeline in the event of partial collapse of this timber

bulkhead. The relocation of these lines would be provided with increased protection from the rock which underlies the road bed. The expansion or extension of the rip-rap seawall into this area could create secondary impacts though an increase in beach erosion and may be inconsistent with city of Goleta policies for protecting the beach environment. If design review determines that additional rip-rap is necessary to protect aging timber bulkhead between Piers 421-1 and 421-2, such improvements would be subject to appropriate permits from the city of Goleta.

Impact S-4: Potential for Release of Oil or Hazardous Materials or Fire/Explosion from PRC 421-2

Operation of the proposed Project could result in the release of oil or hazardous materials from Project facilities, including the 421-2 well and caisson, drilling and separation equipment, associated pipelines, and facilities associated with oil transportation (Potentially Significant, Class I).

Impact Discussion

Because of the proximity of Well 421-2 to the shoreline, a release of oil during production into the marine environment or nearby sensitive habitats is a concern. The potential for oil to be released and enter the marine environment is a function of the potential frequency of a release over the life of the Project, and the ability of the released volume to exceed or otherwise breach the containment within the pier and caisson.

Spill frequency can be estimated for operations for which there are data to support calculations. Oil spill occurrence rates for offshore oil spills from production platforms are based on years of data collected for activities on the outer continental shelf (OCS).[3] However, operations – past and proposed – at PRC 421 are somewhat anomalous as compared to those for which there are well-established statistics: OCS platform and pipeline operations and tank vessel transit. In consultation with CSLC Mineral Resources Management, a decision was made to forego a spill frequency estimate based on: (1) low PRC 421 throughput relative to spill volume data collected for OCS spill occurrence rates,[4] (2) applicability of the OCS data to PRC 421 operations, and (3) the relatively short operating time period of the proposed Project. For the purpose of

[3] See: Anderson and LaBelle 2000.
[4] Spill occurrence rates are a function of historic volumes of oil handled (the "exposure variable"), and address only spills of 1,000 barrels or more.

this analysis, the release of a worst-case discharge was assumed, regardless of likelihood.

A reasonable worst-case discharge of oil from PRC 421-2 would involve an uncontrolled release of oil as follows:

- Complete loss of contents of the separation vessels and associated piping (9 barrels);
- Shutdown of ESP delayed 5 minutes, assuming a maximum flow rate of approximately 0.7 barrel per minute between the wellhead and the separation vessel (3.5 barrel)[5]; and
- Wellhead drilling and production and well workovers could lead to a failure anywhere along the casing leading to a blowout which, if it occurred below the caisson on Pier 421-2, could release oil into sub-surface areas which could make its way over time into the ocean. As discussed below, the amount of oil released from such a spill would be roughly equivalent to that from a delayed shut down of the ESP (3.5 barrels).

Based on these assumptions, the maximum spill volume is estimated to be 12.5 barrels, and the containment capacity within the well casing is 213 barrels. Because the caisson deck wall is not specifically designed to act as containment, no containment capacity is assumed for the caisson deck. Therefore, there is adequate containment capacity in the well casing to contain the entire volume of oil that could be released; no oil is expected to be released to the shore or marine waters.

However, the separation equipment, which would be on the caisson deck, would be exposed and, under severe conditions, released oil could escape the caisson deck and migrate onto the beach or into the water, and not be captured in the well cellar. Further, as discussed in the engineering review, while the separators are proven technologies, they are not typically located where they would be exposed to potential wave action. The location of the separators and associated instrumentation at PRC 421 and their exposure to weather and wave action could potentially result in oil and gas leakage, as evidenced by such technology being upset on offshore platforms in the Gulf of Mexico by severe wave action associated with Hurricane Katrina in 2005.

Production at PRC 421 would utilize a submersible pump. The risk of a blowout would be minimized due to the relatively low pressures of this system (978 psig) when compared to the ability of the safety systems at PRC 421 to control the pressure and

[5] Derived from flow curves provided by Venoco (2006).

the rating of 3,000 psig for the well casing. However, the wells could produce releases at the wellhead due to failures associated with the piping, fittings, or safety valves. A release could also be produced during a workover in the event that operations encounter a gas pocket or pressurized zone during drilling. In addition, sub-surface damage to the well casing and liner could result in accidental release of oil. Such damage, while very unlikely, could occur from several sources such as corrosion, aging of the casing, and seismic damage. If such a failure occurred near the surface, and the pump continued to run for five minutes prior to shutdown, a relatively small quantity of oil contained in the casing (estimated 3.5 barrels) could reach the surface. In addition, the slight potential exists under these circumstances that artesian pressure present in Well 421-2 could force the rotors in the ESP to spin, slowly releasing oil into the casing and environment, until repairs were affected. However, only a small proportion of blowouts release significant volumes of oil, and as discussed above, minimal gas production is anticipated to be associated with this Project.

Well workovers are also a possible source of blowouts. The Hydrocarbon Leak and Ignition Database (1992) estimates well workovers are performed every seven years. As such, the potential exists for the Project to require one to two or more workovers during its productive life. Blowouts have the potential to occur in sub-surface areas below the caisson deck. These blowouts would not be contained by the well cellar or caisson deck and would therefore be released directly to the sub-surface areas and potentially into the ocean. Blowouts that occur at the wellhead or the caisson deck could be contained the well cellar and caisson deck; however, larger blowouts could directly affect the ocean. There have been four blowouts from Pacific OCS oil/gas projects since 1992; two of which occurred in the years 2000 and 2004 from Platform Gail which is operated by Venoco. Neither resulted in release of significant volumes of oil into the ocean; however, both were due, at least in part, to human error (Santa Barbara County 2007).

Over the life of the Project, the produced oil would range from 85 to 11 percent by volume, as the fraction of produced water increases over time. Therefore, the oil portion of the material available for release from the PRC 421-2 structure would decline over the life of the Project. This analysis uses the maximum volume of oil.

The location of the well at the water line and surf zone affects the possible movement and dispersion of any released oil. As a result of the location, a release under most conditions would immediately contact the shore. Because of the location of the facility at the water line, and the low estimated release volumes, spill simulations were not

conducted. Instead, for the purposes of evaluating the potential impacts of released oil from the Project and considering the site's exposure to winter storm conditions, based on predominant ocean currents (see Sections 4.5, Hydrology, Water Resources, and Water Quality and 4.6, Marine Biological Resources), oil released to marine waters is assumed to be transported approximately 1 mile northwest of the site and 2 miles to the southeast, as shown in Figure 4.2-7.

Although there are sensitive locations throughout the Project area, two sensitive sites on either side of the Project facilities are specifically identified in the ACP, and would be immediately vulnerable if there were an oil spill from PRC 421: Bell Canyon Creek (Site 4-640-A) and Devereux Slough estuaries (Site 4-645-A). Excerpts of the ACP entries for these sites are included in Figures 4.2-8 and 4.2-9. In addition, both rocky intertidal habitat and kelp beds exist within 0.5 miles east of the site and an additional estuary associated with Tecolote Creek exists 0.25 miles west of the site.

Venoco maintains a response capability at Ellwood based on discharges estimated for the South Ellwood Field. The worst-case discharge planning volume for this field is 3,000 barrels, and Venoco has response resources capable of handling a 3,000-barrel shoreline clean-up (Venoco 2005). On-water containment and recovery would be conducted by Clean Seas, an oil spill response organization, and onshore clean-up would be conducted by Advanced Cleanup Technologies Inc. (ACTI), a contractor. Both Clean Seas and ACTI maintain equipment lists and certifications as required by State and Federal regulations (Venoco 2005). The oil spill contingency plan is implemented, in part, by conducting drills to test and improve the response capabilities over time.

Aside from booming strategies for an on-water release, most procedures contained in the Ellwood emergency plans are not specific to PRC 421. Recent emergency drills have focused on H_2S and similar emergencies at the EOF and EMT (Venoco 1999-2004). Because Venoco has not been producing from the PRC 421 lease area, the current EAP for South Elwood does not contain any response procedures for response to a release at PRC 421 and thus would need to be updated to address a release associated with recommissioned production under the proposed Project.

Crude oil is ignitable and can cause a fire. Design features incorporated into the proposed Project include regulatory and industry standards for safety and fire prevention, which reduce the probability of a fire significantly. Coupled with the absence of ignition sources available to ignite released oil, the likelihood of a fire is remote.

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Estimated Oil Spill Coverage in Project Area

FIGURE 4.2-7

SITE DESCRIPTION

Bell Canyon Creek is a moderate sized creek with a well developed lagoon just west of Sandpiper Golf Course; the sand berm which develops during summer is usually relatively low and the lagoon is subject to wash over especially during high tides. The creek flow during winter is usually enough to breach the berm. The beaches to the east and west are of fine- to medium-grained sand, and often have very high volumes of debris (mostly wood and kelp) especially after rains. The Venoco oil facility lies less than 1/4 mile inland.

SEASONAL AND SPECIAL RESOURCE CONCERNS

Whenever the lagoon mouth is open or subject to high tide wash over, wetland biota are at risk.

RESOURCES OF PRIMARY CONCERN

Wetland biota including Tidewater goby and possibly Steelhead trout; plus waterfowl and marsh vegetation.

Waterfowl, seabirds (including Brown pelicans) and various shorebirds.

Sea otters have been known to pass through the area.

CULTURAL, HISTORIC, AND ARCHEOLOGICAL SENSITIVITIES

Cultural, historical, and archeological sites are known to exist in the area; however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082, the State Office of Historical Preservation at (916) 653-6624, and/or the Central Coast Archeological Information Center at (805) 893-2474.

Source: Area Contingency Plan October 2005.

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Area Contingency Plan Summary:
Bell Canyon Creek

FIGURE
4.2-8

SITE DESCRIPTION

Devereaux Slough lies just north of Coal Oil Point. This 45-acre slough contains freshwater emergent vegetation, salt marsh, tidal flats and sand dune habitats. The mouth is generally cut off from the ocean by a well developed sand berm except during heavy rainfall. East and west of the slough are extensive medium-grained sand beaches backed by vegetated dunes. Large surf and strong winds are common, especially in winter. The slough is part of the larger Coal Oil Point natural reserve, managed by the University of California at Santa Barbara.

SEASONAL AND SPECIAL RESOURCE CONCERNS

Whenever the slough is open to the ocean, typically only during heavy rainfall, wetlands biota are at risk.

RESOURCES OF PRIMARY CONCERN

Western snowy plovers (all year), California lest terns (April through September), American coot, American wigeon, Black-crowned night heron, Canvasback, Green winged teal (March through July), Mallard, Pintail, and Red-breasted merganser.

Sea otters have been known to pass through the area.
California spiny lobster

Tidewater goby (August through November).

Eelgrass, Surfgrass.

CULTURAL, HISTORIC, AND ARCHEOLOGICAL SENSITIVITIES

Cultural, historical, and archeological sites are known to exist in the area; however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082, the State Office of Historical Preservation at (916) 653-6624, and/or the Central Coast Archeological Information Center at (805) 893-2474.

Source: Area Contingency Plan October 2005.

amec

**Area Contingency Plan Summary:
Devereux Slough**

**FIGURE
4.2-9**

Summary

There is a low probability for a release of oil from the production process at PRC 421-2 because of the safeguards designed into the system that are “fail-safe” (i.e., loss of power would shut in the valves) and would prevent oil from reaching the surface under non-routine conditions. The separation equipment, however, would be situated on the caisson deck and would not be provided the same protections as the ESP and other features protected by the caisson; this type of separation equipment is a proven technology but not typically used in such an exposed environment.

Containment capacity in the well cellar, in the event oil is released, is adequate to contain expected volumes of oil given design capacity and pumping rates. However, the well cellar is an old structure of unknown condition, and as such, its ability to fully contain spills is unknown. Sands and materials enclosed in the caisson could be contaminated by leakage produced by the Project if the cellar is not adequately sealed. As such, as discussed below, if the cellar is to serve as containment, it would require improvements to ensure its condition and suitability to prevent additional migration of oil from PRC 421-2. Because the caisson deck wall is not specifically designed as containment, it would also require improvements and no containment capacity is assumed as part of the impact analysis for the caisson deck.

Further, although remote, the potential exists for a well blowout to occur below the containment area provided by the well cellar and caisson, with an associated potential for release into the marine environment. Such a blowout could occur during routine operations due to human error or during the estimated one to two well workovers that could occur over the productive life of the Project.

Venoco currently maintains response capability adequate to respond to the likely spill volumes at PRC 421, although site-specific procedures would need immediate revision and drills to test new procedures and equipment.

A release of oil to marine waters would be a significant impact. However, the Project design incorporates safety features that would substantially reduce the potential for a release. The short operating period also contributes to a low potential for release. Further, containment provided by the caisson is adequate to capture maximum spill volumes, should the spill occur on the caisson deck.

The potential for a fire at the pier is remote, and the pier is not located in close proximity to the public. A fire at the pier, however unlikely, would be a significant impact, and it is not possible to eliminate the potential for these conditions. The public could also face potentially hazardous conditions if hydrocarbon or sulfurous leaks occurred from the sides of the caisson structures, as happened recently from the side of 421-1 and the seaward side of 421-2. MM S-2b requires that repairs and improvements to all caisson walls would be required which would minimize direct public exposure to potential leaks, and restricted access to the pier and equipment would limit public exposure to hazardous conditions. However, because of the remote potential for blowouts or other failures to occur, with subsequent release of oil into the marine environment; no matter how low the probability, this impact would be potentially significant and unavoidable (Class I).

Mitigation Measures

MM S-4a. **Protection for Separation Equipment.** Venoco shall modify the Project design to include wave splash shields to protect equipment from wave action to prevent damage during winter storms that could cause a release from the vessels or associated piping. Venoco shall also prepare and submit a contingency plan for shutting down operations during severe weather conditions to reduce the potential for damaged equipment and released oil. This plan shall specify the severity of the storm which would require shut down, the estimated timing and duration of such shut downs, and tracking measures and reporting provision to regulatory agencies. This plan shall be submitted to the CSLC for review and approval.

MM S-4b. **Containment.** Venoco shall upgrade the containment features of the Project design:

Well cellar – As the primary containment at PRC 421-2, the well cellar must be tested to determine whether it is leaking, and coated with a rubber type liner or other sealant to prevent migration from the cellar walls or bottom to surrounding areas. If the well cellar is leaking, it shall be replaced by a double-walled cellar capable of containing oil and preventing migration.

Caisson deck – The caisson deck shall be modified to include a “rubber type” liner inside the casing sealed against the casing wall and/ or other improvements to function as secondary containment on the deck. Because the separation equipment is most vulnerable to storm conditions, leakage may escape before it drains to the well cellar, and additional protection on the deck is necessary to prevent migration to the beach and water. The revised design, which includes these

improvements, shall be reviewed and certified by a registered engineer and submitted to the CSLC for approval.

MM S-4c. **Response Drills and Planning.** Venoco shall revise its existing Oil Spill Contingency Plan to include site-specific procedures for response to a release from PRC 421-2, in accordance with applicable State and Federal regulations. A tabletop exercise shall be conducted within six months of operation to test and improve upon the revised procedures. The critique and recommendations shall be submitted to the CSLC and shall include a timetable for implementation.

MM S-4d. **Fire Prevention and Suppression.** Venoco shall revise the existing Fire Prevention and Preparedness Plan to incorporate the new equipment and operations at PRC 421, and submit to the CSLC, Santa Barbara County Fire Department, and city of Goleta for review and approval. The plan shall be revised and provided to the agencies for review prior to commencing operations, and the plan shall be formally updated and circulated within one month of commencing operations.

MM S-4e. **Casing Pressure Testing.** Prior to initiating active pumping, Venoco shall perform pressure testing on the well casing to ensure that this casing meets required operating specifications of 3,000 psig. If the casing is shown to not meet existing required specifications for projected pump operating pressures of 785 psig, Venoco shall implement casing repairs and improvements subject to review and approval by CSLC, Santa Barbara County, and the city of Goleta.

MM S-4f. **Regular Facility Inspections.** As part of its daily facility inspections, Venoco shall check the caissons at both PRC 412-1 and 421-2 for signs of oily or sulfurous leaks. If leaks are detected, Venoco shall report this occurrence to CSLC, County of Santa Barbara, and the city of Goleta and in coordination with these agencies, take immediate steps to clean up or repair such leaks and prevent public exposure to any hazards.

Rationale for Mitigation

The MMs are intended to improve prevention of releases by shielding (i.e., protecting) the separation equipment, which would be most vulnerable to weather and wave action. The measures also provide for additional containment and response planning to reduce the potential for spilled oil to be uncontrolled. Facility-specific response drills are intended to refine existing plans and procedures to address new facilities at PRC 421.

Residual Impacts

Although there is a low probability of an oil release to marine waters, and the application of MMs would further reduce the potential for and effects of released oil on the

environment, under the thresholds of significance *any* release of oil to the marine environment would be considered significant (Class I).

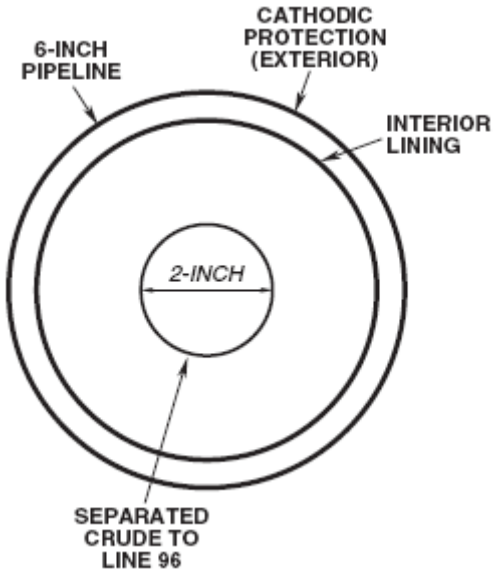
Impact S-5: Potential for Release of Oil or Hazardous Materials From the Crude Oil Flow Line

Operation of the proposed Project could result in the release of oil or hazardous materials from the crude oil flow line as oil is transported from Well 421-2 to Line 96 (Potentially Significant, Class II).

Impact Discussion

Produced crude oil would be transferred from Pier 421-2 to the Line 96 tie-in via a 2-inch diameter flow line. The flow line would be contained within the existing 6-inch pipeline that would be repaired, cleaned, lined and fitted with cathodic protection (external) and a leak detection system. Figure 4.2-10 illustrates a cross-section of the flow line within the pipeline.

FIGURE 4.2-10. FLOW LINE CROSS-SECTION DIAGRAM



The leak detection system would consist of high- and low-pressure sensing switches that would be installed in the 6-inch line. Within 15 seconds of a change in pressure (high or low), the subsurface and safety valves would be shut, which would stop flow of oil into the flow line. Upstream of the separators there would be high- and low-pressure switches and the 6-inch pipeline would be equipped with a high-pressure switch.

A flow safety valve at the Line 96 tie-in would prevent backflow from Line 96 into the flow line, which limits the oil available for release. The 6-inch pipeline would act as secondary containment if there were a leak or break in the flow line.

The volume of oil that would be contained in the 2-inch flow line, between the valve at Pier 421-2 and the flow safety valve at the Line 96 tie-in, is approximately 8 barrels. An additional volume resulting from the time to shut off the flow (conservatively using 5 minutes instead of 15 seconds) is 3.5 barrels, assuming a flow rate of 0.7 barrel per minute based on projected pumping rates. Therefore, the total volume of oil available for release from the flow line is 11.5 barrels. Based upon a 1,800 foot length from Pier 421-I to the EOF, it is estimated that the 6-inch line could contain approximately 50 barrels of oil in the event of a spill. Therefore, the containment capacity of the 6-inch line would be more than sufficient to contain the maximum projected spill from the 2-inch flow line.

As described above, the design of the flow line provides a system of detecting leaks, shutting down flow, and containing released oil within the 6-inch pipeline, which would be tested and lined prior to operation. Therefore the likelihood of an uncontained release is low. A catastrophic break (e.g., from construction equipment) could potentially cause a release of the entire contents of the line, as calculated above.

In its proposed design, there is no mechanism for detecting a breach or leak in the 6-inch pipeline. Thus, while the 6-inch line would provide adequate containment, if this pipeline were damaged, such damage could go undetected due to the lack of leak detection systems for this outer containment vessel. Further, although located within a road and area known to contain sub-surface oil facilities such as pipelines, there is some potential for accidental damage to occur to this oil line during trenching or other unanticipated future construction activities.

Because of the proximity of the flow line to the surf zone, Bell Canyon Creek, and other nearby sensitive resources, a release from the flow line is of particular concern and would be potentially significant (Class II), even though the volume is relatively low and spills to land are typically contained more readily than spills to water.

Mitigation Measures:

MM S-5a. Install Pipeline Warning Markers. Venoco shall modify Project design to include installation of several pipeline markers along the 6-inch line to identify the pipeline route and associated excavation hazards.

MM S-5b. Install Pipeline Monitoring Equipment. Venoco shall install pipeline leak detection monitoring equipment to detect any leaks in the 6-inch line which could include charging the annulus with 30 psig of nitrogen to provide a means of monitoring both a flow line leak by high-pressure trip and a leak in the 6-inch casing by a low-pressure trip.

MM S-5c. Develop Emergency Action Plan. Venoco shall develop and incorporate into the EAP updated descriptions of the pipeline and flow lines, detection systems, emergency shutdown, and response procedures specific to the new system prior to the initiation of operation. The update notice for these revisions shall be provided to the current plan holders within two months of initiating operations.

Rationale for Mitigation

Measure MMs S-5a through S-5c would reduce the potential for release by alerting future workers in the area to the pipeline location and by improving leak detection for the 6-inch pipeline, which could have or develop a leak that would diminish its protective quality. Updates to plans and procedures would provide responders with better information to manage emergency conditions.

Impact S-6: Increased Potential for Release of Oil or Hazardous Materials or Fire/Explosion from Oil Transfer in Line 96

Implementation of the proposed Project would increase throughput in Line 96 and therefore increase the potential for a release of oil or hazardous materials or of a fire or explosion (Less than Significant, Class III).

As shown in Figure 4.2-1, the produced oil flow line would tie-in to Line 96 for transfer to the EMT. Line 96 is currently in operation, and its potential impacts were analyzed in the EMT EIR (CSLC 2006a). That analysis is incorporated here by reference, and was summarized above in Section 4.2.1, Environmental Setting.

The proposed Project would not require physical modification to Line 96 or changes in its operations. Oil produced from PRC 421 would be commingled with oil produced from Platform Holly, which has different characteristics. As discussed previously, PRC 421 produces sweet crude oil.

Release of Oil

The Draft EMT EIR estimated failure rates and spill probabilities for Line 96. As discussed in that document, the failure rate, which is a function of pipeline length rather than throughput, is unchanged by increased throughput; the Draft EMT EIR addressed

increased throughput at the EMT and there was no increase in the number of expected spills from Line 96 (CSLC 2006a). Similarly, the addition of crude oil from PRC 421 would not change the expected frequency of releases from Line 96.

Under higher throughput scenarios, the Draft EIR noted spill volume from Line 96 may be "somewhat greater" because the pipeline would likely have a higher volume of oil in it, but the incremental increase was not quantified (CSLC 2006a).

The Draft EIR also characterized the existing risk from exposure to toxic vapors from a crude oil spill from Line 96. Under the permitted throughput (EMT Project) analysis, the potential spill size could increase "marginally" and thereby increase the size of the hazard zone around Line 96 (CSLC 2006a). The hazard zone is a function of the H_2S content of the crude oil produced at Platform Holly, which is sour crude oil. The oil produced by the proposed Project at PRC 421 does not contain H_2S in concentrations that exceed applicable thresholds or acute risk, and therefore would not contribute to an incremental increase in the existing risk (baseline conditions) associated with a release of oil from Line 96.

Fire

The Draft EMT EIR analyzed the potential for fire and attendant injury from thermal radiation caused by a release from Line 96. The existing risk of fire and thermal impacts were characterized as being low and, despite a marginal increase in potential spill size under increased throughput, the risk of fire and thermal impacts resulting from Line 96 were not determined to increase with increased throughput (CSLC 2006a). Therefore, the Project would not cause an increased potential for fire above baseline conditions.

Summary

The Project would contribute additional throughput to the existing throughput of Line 96, which could yield a marginal increase in spill volume if there were a spill. The Project would not result in an increase in spill frequency or acute risks of a spill from Line 96. The existing risk of a fire associated with released crude oil from Line 96 is considered low, and increased throughput from the Project would not increase the potential for fire or thermal impacts related to a fire.

The Project would not increase the potential for oil releases or fires over baseline conditions for Line 96, and would not pose the same acute risks present in the baseline

conditions because of its lower H_2S content relative to oil transported under the baseline conditions. This impact is adverse but not significant (Class III).

Mitigation Measures

None required.

Rationale for Mitigation

Not applicable.

Impact S-7: Oil Release from Line 96 as a Result of Increased Pressure from the Project

The reported design pressure for Line 96 is lower than that for equipment associated with the proposed Project; therefore, the potential exists for a release of oil to occur from Line 96 as a result of increased pressure from the Project (Potentially Significant, Class II).

In the engineering review of PRC 421 design (see Appendix C), it was noted that the reported design pressure for Line 96 is 285 psig, while the maximum operating pressure for both the proposed 2-inch line and Line 96 is 415 psig. In the absence of an appropriate pressure safety valve, this potential differential in pressure could lead to accidental release of oil. The proposed Project equipment and piping has a design pressure of 740 psig.

Mitigation Measures

MM S-7. Line 96 Over-Pressure Protection. Venoco shall install a PSV on Line 96 set at a maximum of 285 psig to provide over-pressure protection.

Rationale for Mitigation

MM S-7a would address the potential for overpressure in Line 96, which could lead to a release. The options would be reviewed by applicable agencies for decision on which option is to be implemented.

Impacts Related to Storage and Transfer of Crude at EMT

Crude oil delivered by Line 96 is stored in tanks at the EMT and transferred in loading lines to the marine portion of the facility to load the barge Jovalan. As described in the Draft EMT EIR, release scenarios include full ruptures or leaks from crude oil tanks,

valves, pumps, and piping connections. Releases from tanks would be contained within berms. Releases from other equipment may be uncontained.

Released oil could produce toxic impacts from the H_2S contained in the oil handled at the EMT. Spilled oil could also ignite and result in thermal impacts. As noted in the Draft EMT EIR, these effects fall within the acceptable risk thresholds of Santa Barbara County's Safety Element based on the application of the county's risk criteria, which take into account the quantity and character of the material, location within the EMT, and expected receptors in the surrounding land uses (CSLC 2006a).

At peak production, the proposed Project would increase throughput of the EMT by up to 700 BOPD, a maximum increase of approximately 16 percent over existing EMT throughput levels.

Impact S-8: Increased Potential for Fire at the EMT

Implementation of the proposed Project would increase throughput at the EMT and increase the potential for fire at the EMT (Less than Significant, Class III).

According the Draft EMT EIR, increased throughput would not change the existing consequences caused by crude oil fires and thermal radiation (CSLC 2006a). This assessment would apply to the additional throughput from PRC 421 production, and the existing risk of injury from thermal impacts at the EMT would remain within the Santa Barbara County acceptable risk threshold. This impact is adverse but not significant (Class III).

Mitigation Measures:

The Draft EMT EIR proposes mitigations HM-1a and HM-1b, HM-3a, HM-4a, HM-5a, HM-6a, HM-7a, HM-8a, and HM-9a that are incorporated by reference into this document. These MMs generally require facility maintenance, establish monitoring programs, and improve emergency response to spills and emergency situations. No additional mitigations are recommended (see Appendix H for complete text of the MMs).

Rationale for Mitigation

The proposed MMs would reduce the potential for crude oil releases, and therefore the opportunity for crude oil fires and attendant effects.

Impact S-9: Increased Potential for a Release of Oil or Hazardous Materials from the EMT

The proposed Project would increase throughput at the EMT by 700 BOPD at peak production, a maximum increase of approximately 16 percent over existing EMT throughput levels. As a result, the potential for a release of oil or hazardous materials from the EMT increases (Significant, Class I).

The Draft EMT EIR analyzed the expected increase in spill volume and frequency resulting from increased throughput. Compared to existing throughput at the EMT, implementation of the proposed Project's operations would increase EMT throughput and operating hours. Because the infrastructure and transfer rates would be unchanged, spill volume would be unaffected by throughput changes. So an increase in throughput from the proposed Project would not affect spill volume. The analysis does, however, attribute some increases in spill volume to inadequate compliance with protective and response measures, and applies mitigations accordingly, though these are not related to changes in throughput (CSLC 2006a).

An increase in throughput at the EMT would increase the number of transfers at the facility, as well as the associated spill frequency from the loading lines and equipment. Despite a nearly four-fold increase in transfers, as analyzed in the Draft EMT EIR, the expected spill frequency resulted in substantially less than a four-fold increase in spill frequency from baseline conditions. For example, as shown in Table 4.2-5, the change from 23 to 88 annual transfers only increases the potential of an EMT loading line spill into the ocean from 84 percent to 86 percent over 10 years. The additional throughput from PRC 421 would fall within this range, and at a maximum of 28 transfers per year (PRC 421 maximum throughput added to EMT existing conditions), would be nearly the same as existing conditions.

Table 4.2-5. Comparison of EMT Lifetime Spill Probabilities, Percent[1]

EMT Release Scenario	Existing Conditions [2]	Permitted Operations [3]
EMT Loading Line – Leak on Land	11	10
EMT Loading Line – Leak on Ocean	82	81
EMT Loading Line – Rupture on Land	0.1	0.3
EMT Loading Line – Rupture on Ocean	0.9	3.2
Pumps and Pumping Equipment	<0.1	0.1

[1] For a 10-year project life, probability of a single spill (CSLC 2006a)

[2] Based on 23 transfers per year

[3] Based on 88 transfers per year

The Draft EMT EIR classifies the effects of increased throughput as significant because any increased potential for release of oil to the environment exceeds significance criteria. Therefore, the addition of PRC 421 crude oil to EMT operations would have some increase in spill frequency, and is therefore significant (Class I).

Mitigation Measures

The Draft EMT EIR proposes MMs HM-1a and HM-1b, HM-3a, HM-4a, HM-5a, HM-6a, HM-7a, HM-8a, and HM-9a that are incorporated by reference into this document. These MMs generally require facility maintenance, establish monitoring programs, and improve emergency response to spills and emergency situations. No additional MMs are available (See Appendix H for complete text of the MMs).

Rationale for Mitigation

The EMT-related mitigations proposed in the Draft EMT EIR would reduce the potential frequency, volume, and dispersion through prevention and response planning. For more detailed discussion of the individual mitigation, refer to the Draft EMT EIR (CSLC 2006a).

Residual Impacts

Proposed mitigations would reduce but not eliminate the potential for oil spills, and therefore the impact would remain significant and unavoidable (Class I).

Impact S-10: Potential for a Release of Oil from Barge Transportation

The proposed Project would increase the number of barge trips each year transporting crude from the Ellwood area to market and the potential for a release of oil during barge transportation (Significant, Class I).

The barge Jovalan transports crude oil from the EMT to refineries in Los Angeles and San Francisco. It is single-hulled and has a reasonable worst-case discharge of 14,000 bls (588,000 gallons), and a catastrophic worst-case discharge of 56,000 barrels (2,352,000 gallons) (CSLC 2006a). The Draft EMT EIR estimated future spills under the EMT's current and projected ("permitted") operating rates using historical data by size of spill and other variables.[6] Under the EMT permitted scenario, there would be 88 barge transfers per year, compared to the current frequency of 23 per year. Maximum throughput from the proposed Project would increase barge transfers at the EMT by five

[6] For a complete description of the data and exposure variables used to calculate these probabilities, see CSLC 2006a.

per year over the current number of transfers. Table 4.2-6 presents the estimated barge spill frequency for PRC 421 maximum throughput, compared with current and

Table 4.2-6. Estimated Barge Spill Frequencies

Scenario	Current EMT		With PRC 421		EMT Permitted	
	Failure Rate [1]	Spill Probability[2] (percent)	Failure Rate [1]	Spill Probability[2] (percent)	Failure Rate [1]	Spill Probability[2] (percent)
By spill size:						
<1 gallon	2.459E-02	21.8	2.994E-02	25.9	9.409E-02	61.0
>1 gallon	2.095E-02	18.9	2.550E-02	22.5	8.015E-02	55.1
>10 gallons	1.426E-02	13.3	1.663E-02	15.3	5.227E-02	40.7
>100 gallons	6.376E-03	6.2	7.762E-03	7.5	2.439E-02	21.6
>1000 gallons	2.277E-03	2.3	2.772E-03	2.7	8.712E-03	8.3
>10000 gallons	9.563E-05	0.1	1.164E-04	0.1	3.659E-04	0.4
>100000 gallons	1.138E-05	0.0	1.386E-05	0.0	4.356E-05	0.0
Release in transit:						
Spill from barge, transit to LA or SF	2.64E-03	2.6	3.21E-03	3.2	1.01E-02	9.6

[1] Events per year.

[2] Probability over 10-year EMT project life. Although the period through 2013 is less than 10 years, this time horizon was used for consistency with the Draft EMT EIR.

permitted EMT scenarios. The probability for small spills (<1 gallon) over a 10-year period would increase by approximately 4 percent to a 25.9 percent chance that such a spill would occur. However, because PRC 421 throughput would decline over a 10-year period, this estimate overstates the overall probability.

Venoco currently maintains response capabilities for spills at the EMT and while the vessel is in transit, as required by Federal and State regulations. The small increase in spill probability would not change Venoco's compliance with these regulations or the ability to respond.

Mitigation Measures

The Draft EMT EIR proposes mitigations HM-1a and HM-1b, HM-3a, HM-4a, HM-5a, HM-6a, HM-7a, HM-8a, and HM-9a that are incorporated by reference into this document. These MMs require facility maintenance, establish monitoring programs, and improve emergency response to spills and emergency situations. No additional MMs are available (See Appendix H for complete text of the MMs).

Rationale for Mitigation

Proposed MMs would reduce the potential for release from barge hull penetration and improve the effectiveness of response through drills and planning.

Residual Impacts

Implementation of proposed MMs would reduce but not eliminate the potential for releases of oil; therefore, the impact remains significant (Class I).

Impacts Related to Future Transportation Options

For the purposes of this safety analysis, it is assumed that Line 96 and the EMT would be used to transport crude oil recovered from PRC 421 using the barge Jovalan to ship the oil to a Los Angeles or San Francisco Bay area refinery through approximately the year 2013 (five-year period) or beyond. However, as discussed earlier in this EIR (Sections 1.2.4, 2.4.2, and 3.3.6), several options exist for future transportation of oil from the Project, each with different potential safety impacts. These include ongoing use of the EMT through 2013, use of a pipeline to Las Flores Canyon, and trucking of oil to Venoco's ROSF Facility 35 miles to the south and subsequent transport to Los Angeles via pipeline. The potential safety impacts from transportation using the existing EMT system are fully described above (see Impacts S-6 through S-10).

However, because the timing and exact mode of transportation of produced oil after the initial five years of Project operation are speculative at this point in time, the potential impacts of use of a pipeline or trucking are only briefly summarized here and are fully disclosed as part of the alternatives analysis (Section 4.2.5, Transportation Sub-Alternative Options; Impacts S-12 through S-14). If none of these options is permitted or available by the cessation of operation of the EMT, production from PRC 421 would be stranded, at least temporarily, until an alternative transportation mode is approved and becomes available.

Transportation of oil through an 8.5-mile pipeline from the EOF to the AAPL at Las Flores Canyon could create potential impacts through an increased potential for spills from such a pipeline. Although the timing of construction of the new pipeline is uncertain, transportation of oil via pipeline could commence as early as 2009 or 2010, resulting in 10 or more years of transportation by pipeline. Although the chance of a spill or release exists, pipelines are the safest method available for the transportation of crude oil. Further, the new 8.5-mile long proposed pipeline would be equipped with state of the industry safety measures, including cathodic protection against corrosion

and “smart pigging” capabilities. These new state of the industry construction and safety features, when combined with the limited 12 year operating horizon would reduce the potential for pipeline spills to insignificance (See Impact S-11 below).

Future transportation of oil via a combination of trucking for 35 miles from the EOF to the ROSF and via existing pipeline south to Los Angeles would incrementally increase the potential for spills. However, under the proposed Project, trucking would commence no earlier than 2013, and would involve not more than 2 trucks per day carrying 160 barrels of oil each, declining to 1 truck per day in the later years of Project operation (see Section 3.3.6, Transportation Sub-Alternative Options, Table 3-2). Based upon the projected frequency of trucking and the distances traveled, shipment of oil via trucking would not be expected to create significant safety impacts due to the insignificant potential for accidents to occur. Similarly, the shipment of oil via existing pipeline which already transports substantial amounts of crude oil would not be expected to measurably increase safety impacts as the failure rate for such pipelines is a function of pipeline length rather than increased throughput. The pipelines would not be modified by the addition of PRC 421 crude oil; therefore, the spill frequencies for the respective pipeline would be unchanged by the proposed Project.

4.2.5 Impacts of Alternatives

No Project Alternative

Under this Alternative, there would be no production at PRC 421, and the facilities would be decommissioned under an accelerated schedule. The No Project Alternative would avoid the majority of impacts associated with production, transfer, and transportation of crude oil produced from PRC 421. However, until the PRC 421 is fully abandoned, potentially significant impacts could occur though partial collapse of either of the caissons, particularly the seaward facing wall of PRC 421-2 which has not been repaired (see Impacts Geo-1, Geo-4; S-2). In addition, while damage to sections of the aging timber bulkhead or under-engineered portions of the seawall protecting this bulkhead could be of concern due to the possible release of potentially contaminated soil into the surf, impacts would be less than those identified for the proposed Project as damage to the existing 6-inch flow line would not have the potential to release oil or produced water into the environment (see Impacts S-4; HAZ-2).

Table 4.2-8. Summary of Project Safety Impacts and Mitigation Measures

Impact	Mitigation Measures
S-1: Release of Oil During Cleanup of 6-inch Pipeline	No additional mitigation is required beyond implementation of BMPs, as proposed.
S-2: Exposure of the Public and Environment to Safety Hazards Due to Collapse of the 421-1 or 421-2 Caissons	**S-2a.** Design Review / Wave Loading Evaluation. **S-2b.** Caisson Improvements.
S-3: Exposure of the Public and Environment to Safety Hazards Due to Collapse of or Damage to the Existing Timber Bulkhead or Rip-Rap Seawall	**S-3a**. Design Review by Structural Engineer. **S-3b.** Pipeline Relocation.
S-4: Potential for Release of Oil or Hazardous Materials or Fire/Explosion from PRC 421-2	**S-4a.** Protection for Separation Equipment. **S-4b.** Containment. **S-4c.** Response Drills and Planning. **S-4d.** Fire Prevention and Suppression. **S-4e**. Casing Pressure Testing. **S-4f**. Regular Facility Inspections.
S-5: Potential for Release of Oil or Hazardous Materials From the Crude Oil Flow Line	**S-5a**. Install Pipeline Warning Markers. **S-5b.** Install Pipeline Monitoring Equipment. **S-5c.** Develop Emergency Action Plan.
S-6: Increased Potential for Release of Oil or Hazardous Materials or Fire/Explosion from Oil Transfer in Line 96	No additional mitigation required.
S-7: Oil Release from Line 96 as a Result of Increased Pressure from the Project	**S-7a.** Line 96 Over-Pressure Protection.
S-8: Increased Potential for Fire at the EMT	Draft EMT EIR Mitigation Measures.
S-9: Increased Potential for a Release of Oil or Hazardous Materials from the EMT	Draft EMT EIR Mitigation Measures.
S-10: Potential for a Release of Oil from Barge Transportation	Draft EMT EIR Mitigation Measures.

Impact S-11: Potential Damage to Aging Caissons and Seawall Prior to Full Abandonment Could Lead to a Release of Oil or Contaminated Materials

The No Project Alternative could expose aging project facilities to damage or collapse over an unknown and potentially extended time period prior to these facilities being fully abandoned and remediated, leading to the potential for release of residual oil and/or contaminated soil or sand from within these facilities. (Significant, Class II).

Project facilities, including the caissons and seawall show signs of weathering, aging and damage typical of structures exposed to continual marine action. Under the No Project Alternative, these facilities could potentially remain shut in for an extended period of time and be exposed to continued damage from waves, potential seismic

activity, etc. As discussed under Impacts S-2 and S-3 above, age, corrosion, weathering, past caisson collapses and undocumented construction techniques create concerns over the long term stability of these structures. In addition, the gaps in the seawall and uncertain stability of the aging timber bulkhead may expose these facilities to damage. Possible damage to these facilities over an extended decommissioning process could expose these facilities to damage and the potential for accidental release of contaminated soil, sand and potentially residual oil (Class II)

Mitigation Measures

MM S-11. Immediate Abandonment Plan. If the CSLC elects to approve the No Project Alternative, Venoco shall file and process an abandonment plan within six months of this CSLC action. This plan shall provide for rapid abandonment, decommissioning and clean-up of all PRC 421 facilities and any associated residual contamination consistent with applicable statutes and regulations.

Rational for Mitigation Measure

MM S-11 would expedite the abandonment process for PRC 421 and minimize the time that these facilities would remain exposed to possible environmental damage. This would reduce the potential for such damage and accidental release of contaminated materials to insignificance.

The potential effects of decommissioning the facilities would be evaluated in a separate analysis.

As noted in Section 2.1.1, the CSLC has concerns about the potential for pressure to build up in the reservoir, causing oil to escape from wells that were abandoned in the 1940s and 1950s. This concern is based on observations following the 1994 shut-in of the PRC 421 wells.

Although the possible releases of oil from previously abandoned wells do not pose direct safety or hazard conditions, the potential for unquantified and uncontrolled releases is of concern, particularly because the releases would directly impact marine waters and coastal habitats. Based upon the thresholds identified in this EIR, any such release of oil into the environment could create potentially significant indirect impacts to affected marine, nearshore and estuarine environments similar to those identified in Impact S-4. However, insufficient data exist to quantify the actual potential for such leaks to occur, their exact location or the size of such leaks; therefore it would be

speculative to identify either the frequency or potential severity of such impacts at this time.

This Alternative would reduce or avoid the majority of the safety impacts identified for the proposed Project, but does present uncertainties about possible reservoir repressurization effects and possible damage to aging facilities prior to full abandonment.

No Project Alternative with Pressure Testing

Under this Alternative, there would be no production at PRC 421, and the facilities would be decommissioned under an accelerated schedule. This Alternative would include a pressure testing program to collect information that would characterize changes to the reservoir pressure, if any, when PRC 421 is abandoned. At that time, the CSLC would make an appropriate decision concerning the repressurization of the reservoir.

The No Project Alternative with Pressure Testing would avoid impacts associated with production, transfer, and transportation of crude oil produced from PRC 421 after the pressure testing is completed and the production ceases.

The potential effects of decommissioning the facilities would be evaluated in a separate analysis.

This alternative would also introduce short-term impacts associated with the pressure testing. The temporary production of oil would have similar effects as the Project production and transfer, but they would be short-term (6 to 12 months in duration).

It is unknown whether the results of the pressure testing would yield information that would resolve the concern about reservoir pressurization and lead to solutions to prevent or mitigate releases. The information gained during the pressure testing may have practical applications for the CSLC and the region. However, absent such action, impacts may remain similar to the No Project Alternative above.

Except for the temporary pressure testing period, this Alternative would reduce or avoid many of the safety impacts identified for the proposed Project. However, depending on the duration of pressure testing and the associated exposure of the aging caissons, seawall and other facilities to potential damage from storms, seismic activity etc.

Onshore Separation at the EOF

Under this Alternative, oil produced from PRC 421 would undergo separation of oil from water and gas at the EOF instead of at Pier 421-2 and water would be re-injected at well WD-1 located at the EOF. The EOF is already equipped with the oil-water separation, treatment, and discharge of produced water systems necessary to treat oil produced from Pier 421-2. Although existing EOF throughput levels would increase, no modifications of existing systems at the EOF would be necessary, beyond the control system improvements envisioned by the proposed Project. The increased throughput levels would remain below the EOF's current permitted level.

Under this Alternative, Pier 421-1 would not be required for water re-injection and the decommissioning of Pier 421-1 would be accelerated. The accelerated decommissioning would require submittal of a decommissioning plan for Pier 421-1 to the CSLC and the City of Goleta within approximately 6 months of approval of this Alternative.

Prior EOF Risk Evaluation

As noted previously, a quantitative risk assessment was conducted for the EOF in 2000, resulting in a set of MMs designed to bring EOF operations in compliance with Santa Barbara County Environmental Thresholds for Public Safety (ADL 2000). The analysis evaluated the facility's operations at permitted (maximum) levels.

Prior to mitigation, the study found the main risk to the population was the separation and storage of liquefied petroleum gas (LPG) and natural gas liquids (NGLs). The quantitative risk assessment further concluded that the toxic risk (i.e., from H_2S) from the facility would be considered acceptable based on the County's Environmental Risk Threshold for Public Safety (ADL 2000). Platform Holly was found to produce an acceptable level of risk, in part because there are no large quantities of flammable gas liquids stored at the facility. At present capacity (below permitted capacity), the facility's risk profile is within the County's risk thresholds for public safety.

Addition of PRC 421 Throughput to EOF Processes

PRC 421 production would enter three process streams at the EOF: crude oil processing, gas sweetening, and produced-water disposal. As noted above, the addition of projected PRC 421 flow volumes would not cause EOF throughput to approach the limits of its permitted capacity, which is lower than its design capacity.

Crude oil processing – Although the proposed Project requires only separation of oil, water and gas, and does not propose full crude oil processing, under this Alternative PRC 421 crude oil would most likely be commingled with crude oil from Platform Holly, and would be processed along with it at the EOF. This approach would represent the simplest means of commingling the two production streams; therefore, that configuration is assumed for the purposes of this review.[7]

Gas sweetening – The PRC 421 gas stream would tie into the EOF gas sweetening system and be commingled with gas from Platform Holly production. PRC 421 gas is not sour, and would not require processing, but would be processed under this Alternative. It is possible the PRC 421 gas stream could bypass this system because of its low sulphur content, but for this discussion its flow through the gas sweetening system was assumed.

Produced-water disposal –Separated water would be discharged into the well that the EOF currently uses for disposal of Holly's produced water (WD-1).

Potential Effects of this Alternative on EOF Operations

Based on the descriptions above and defined throughput levels, the introduction of PRC 421-produced oil, gas, and water would not have adverse effects on the safe operation of the EOF processing systems. Under this Alternative, the EOF would continue to operate below its permitted capacity, and therefore maintain an acceptable risk profile in accordance with the county's Environmental Risk Thresholds for Public Safety. It is expected that any of the modifications developed to implement this Alternative would require prior review and approval by Santa Barbara County to verify that applicable design and safety standards are met.

Oil produced from PRC 421 does not have constituents or concentrations of constituents that would fall outside of EOF processing system design basis or capacity. Therefore, PRC 421 production is suitable for handling and processing at the EOF.

Impacts Avoided by this Alternative

This Alternative would avoid two key impacts posed by the proposed Project:

- By moving the separation process off PRC 421-2 and away from the water, this Alternative would simplify activity and equipment required on Pier 421-2 and avoid the potential for releases from separation equipment on the pier. Project

[7] In the application for the proposed Project, Venoco did not specify how the two streams would be combined.

separation equipment, while effective and appropriate for the Project, is not typically used in the environment posed by the Project, where it would be exposed to wave action and other potentially damaging conditions (see discussion of Impact S-2). The separation process could be conducted more safely away from the water and within an oil processing facility (i.e., at the EOF).

- This Alternative would enable an earlier decommissioning of PRC 421-1 and facilitate the removal of an oil facility component from the surf zone.

Table 4.2-9 summarizes this Alternative's ability to reduce or avoid the Project's impacts. As shown in the table, the impacts of this Alternative associated with production, transfer, and transportation of crude oil produced from PRC 421 would be the same as the proposed Project. The effects of this Alternative associated with the separation process avoid or reduce the potential for releases at PRC 421-2, and because re-injection would occur at Platform Holly, PRC 421-1 could be decommissioned sooner.

Table 4.2-9. Comparison of Onshore Oil Separation Impacts

Project Impacts	Alternative Comparison
Potential for release of oil or hazardous materials, or fire from PRC 421-2 production.	Same effects as proposed Project.
Potential for release of oil or hazardous materials, or fire from the separation process.	Avoid potential for upsets on PRC 421-2 related to gas- and liquid separation. Simplifies activity and equipment on the PRC 421-2 pier. Accelerates decommissioning of PRC 421-1. No adverse effects on EOF risk profile.
Potential for release of oil or hazardous materials from the flow line.	Same potential for release as proposed Project, but the material in the flow line would have a lower oil content.
Increased potential for release of oil or hazardous materials, or fire from Line 96.	Same effects as proposed Project.
Increased potential for release of oil or hazardous materials from the EMT.	Same effects as proposed Project.
Increased potential for fire or explosion at the EMT.	Same effects as proposed Project.
Increased potential for release of oil from barge transportation.	Same effects as proposed Project.
Increased potential for release of oil from pipeline transportation.	Same effects as proposed Project.
Increased potential for release of oil from combined truck and pipeline transportation.	Same effects as proposed Project.

The impacts of this Alternative associated with production, transfer, and transportation of crude oil produced from PRC 421 would be the same as the proposed Project, except the material in the flowline would have a lower oil content. The effects of this Alternative

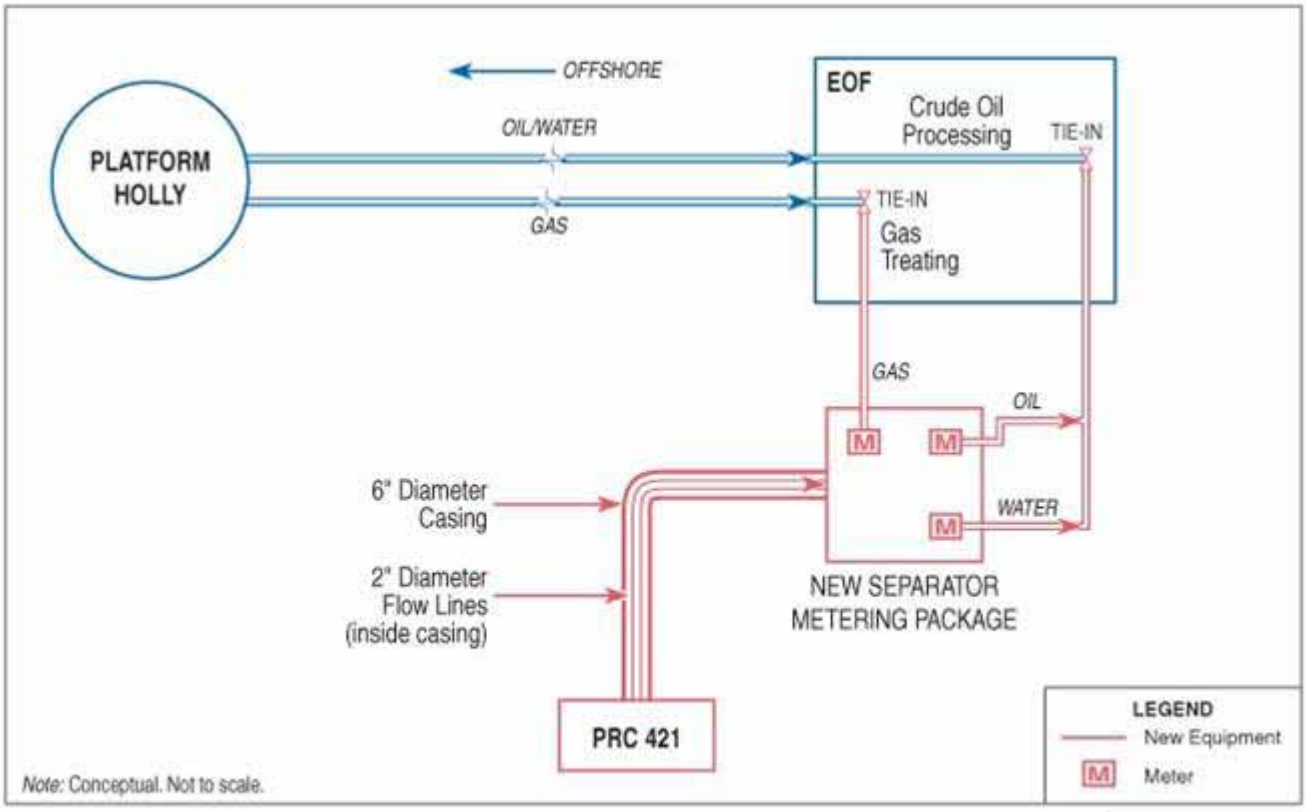
associated with the separation process avoid or reduce the potential for releases at PRC 421-2, and because re-injection would occur at Platform Holly, PRC 421-1 could be decommissioned sooner.

The description of and assumptions related to this alternative for the purposes of this evaluation are summarized below.

Key elements of this Alternative:

- The combined crude oil production of PRC 421 (maximum of 680 BOPD) and Platform Holly production of 4,100 BOPD is equivalent to 24 percent of the EOF's designed operational capacity, and 37 percent of the facility's current permitted capacity.

- New equipment, similar to that associated with the proposed Project, would be installed to separate and meter PRC 421 flow prior to entry into the EOF processing areas (see Figure 4.2-11).



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Conceptual Layout for EOF Onshore Oil Separation

FIGURE 4.2-11

- PRC 421 crude oil would tie into the EOF crude oil processing system.

- PRC 421 water and gas would tie into the produced-water disposal system and gas sweetening system, respectively. It is possible PRC 421 gas could bypass the sweetening system, but this would require verification prior to implementing this Alternative.

Recommissioning Using Historic Production Methods

Implementation of this Alternative would result in a resumption of production at PRC 421, essentially in its historic configuration at the time prior to the wells being shut-in in 1994; however, new technologies would be incorporated to ensure compliance with current industrial and environmental standards.

The facility would use a gas-fired internal combustion engine to power the pump at Pier 421-2. Produced oil and water emulsion would be separated using a free-water knockout system, and produced oil would bypass the EOF, delivering directly via the existing 6-inch line to Line 96 for transmission to the EMT. Produced water would be stored in a tank on Pier 421-1 and periodically re-injected into the underlying formation via the well on Pier 421-1.

This Alternative would yield the same effects as the Project for all components, except production and separation at the piers. The tankage on the piers required for this Alternative would increase the volume of oil available for release at the piers. It also places more equipment on the piers, which would be exposed to wave action and the elements. The diesel-fired engine would provide an additional ignition source. These aspects of this Alternative pose a greater potential for a crude oil release than the proposed Project.

In addition to increased potential spill volume, the presence of diesel-fired engines at the piers places an ignition source in close proximity to the production area and equipment and increases the potential for fire.

This Alternative would not reduce or avoid any of the impacts identified for the proposed Project.

Re-injection at Platform Holly Alternative

Implementation of this Alternative would resume production at PRC 421 as described under the proposed Project; however, produced water would be sent to Platform Holly, via the EOF, for re-injection and Well 421-1 would be decommissioned under an

accelerated schedule. The accelerated decommissioning would require submittal of a decommissioning plan for Pier 421-1 to the CSLC and the City of Goleta within approximately 6 months of approval of this Alternative.

This Alternative would entail installing a flow line that extends from Well 421-2 to the EOF and decommissioning Well 421-1, its caisson, and pier (to be evaluated in a separate analysis). Further, as described in Section 3.3.5, the 4-inch sub-sea utility pipeline which runs from the EOF to Platform Holly is currently in service providing California Public Utilities Commission-grade (PUC) gas to Holly for use as the flare purge and pilot fuel and fuel for the three Holly drilling generators. Therefore, initial disposal of produced water at Platform Holly would require Venoco to cease using the utility line for natural gas and instead use gas produced at Platform Holly which is high in H_2S. As a result, Venoco has recently approached the APCD to request the use of annulus gas at Holly as an alternative to PUC gas for the flare purge and pilot fuel. Annulus gas has higher sulfur content than PUC gas therefore in order to accommodate the use of (or sweeten) the annulus gas, Venoco would need to install new equipment (H_2S scrubbers) and implement operational changes at Holly. To ensure safety, these changes would be subject to review and approval by the SBCAPCD and other regulatory agencies

Transportation Sub-Alternative Options

Under these sub-alternative options, oil would not be sent to Barge Jovalan for delivery to refineries. Instead, oil would either be transported to the AAPL at Las Flores Canyon by a newly constructed pipeline (Figure 3.1) or oil would be transported via truck to the ROSF, located east of Carpinteria. Each of these transportation sub-alternative options would create the potential for impacts to safety as discussed below. It should be noted that a pipeline extending from the EOF to AAPL at Las Flores Canyon is currently proposed as part of the Venoco's Full Field Development, which is currently under review by CSLC. A draft EIR on this project may be available for public review in 2007, with the potential for the pipeline to become operational as early as 2009-2010. Alternately, such a pipeline could also be considered for construction, absent any lease expansions, to serve only existing or expanded production from Platform Holly as well as that from the recommissioning of PRC 421. Cumulative impacts associated with this pipeline are described in section 4.2.6, Safety, Cumulative Impacts.

Pipeline Sub-Alternative

Risks from oil transportation by pipeline are the lowest of any form of crude oil transportation. As the proposed pipeline from the EOF along the Gaviota Coast to Las Flores Canyon would be a new pipeline with the most modern cathodic protection and internal inspection ("smart pigging") capabilities, it would have a lower failure rate than older pipelines such as either the Line 96 pipeline or the existing EMT loading line. However, a risk of a crude oil release to the environment would exist, including a release from the pipeline into Gaviota Coast drainages and perennial streams, which could also subsequently reach the marine environment. However, releases would most likely be smaller in volume, less frequent, and less severe than those for the proposed transport from the EMT loading line and transport via barge Jovalan which are more likely to result in a release that occurs directly into the marine environment.

Pipeline safety is affected by several factors, including both the length and the duration of service of the pipeline. Information on historical risks from pipeline operations, including the size and number of spills and the causes of such spills, are available from a number of sources, two of which are noted below.

Information on the number and causes of pipeline spills greater than 50 barrels in size is available from the DOT/Office of Pipeline Safety (DOT/OPS). These data were obtained for spills from 1968 to 2000 (information from pre-1985 is less reliable in the DOT/OPS data). Information is available from the OPS for crude-oil pipelines, as well as for all liquid pipelines (DOT/OPS 1990). In the years since 1985, crude oil has comprised 42 to 51 percent of the liquid spilled from pipelines, and petroleum products have made up 47 to 55 percent of the total volume spilled. Pipeline corrosion ranks as the most frequent cause of spills, an estimated 39 percent of all failures (since 1985). The number of spills caused by corrosion has remained in the same range since 1985, and there has been no downward trend in the number of spills caused by corrosion since 1985. Third-party impacts rank as the second highest cause of pipeline spills, accounting for 30 percent of all failures.

The California State Fire Marshal (CSFM) publication, Hazardous Liquid Pipeline Risk Assessment (CSFM 1993), analyzed leak information for the 7,800 miles of liquid pipelines within California for the years 1981 through 1990. The CSFM report presented a set of hazardous liquid pipeline incident rates for all pipelines and uses. A review of the CSFM report shows that the following pipeline design and operation parameters can have a significant effect on pipeline spill rates:

- Pipeline age;
- Pipeline diameter;
- Pipe specification;
- Pipe type;
- Normal operating temperature;
- Supervisory Control and Data acquisition (SCADA) (leak detection) system;
- Cathodic protection system;
- Coating type; and
- Internal inspection.

The study found that external corrosion was the major cause of pipeline leaks, causing approximately 59 percent of spills, followed by internal corrosion and third party damage at 20 percent. Operator error and weld failure were also mentioned as minor causes of pipeline failure. Older pipelines and those that operate at higher temperatures had significantly higher spill rates. Crude oil had the highest spill rate primarily due to the transportation of crude oil at elevated temperatures, which increases the rate of external corrosion. This is because faster corrosion rates occur at elevated temperatures when metal comes in contact with soil moisture.

Impact S-12: Potential for Release of Oil From Pipeline Transportation

Transportation of oil via a new pipeline along the Gaviota Coast for the approximately 12-year Project production horizon could result in a release of oil from that pipeline (Class III).

The proposed new 8.5 mile long pipeline would serve production from PRC 421 for a period of approximately 12 years. During this time frame, the proposed pipeline could be subject to damage from both internal and external corrosion and possible third party damage from equipment being operated on some of the agricultural operations along the 8.5 miles of ROW, from road maintenance crews, or from other construction activities a such as those associated with the several proposed residential subdivisions (e.g., Naples) that are pending in areas along or adjacent to the proposed pipeline ROW. Finally, although not a leading cause of ruptures or leaks, faulty construction or operator error could cause leaks.

To prevent these potential problems, the design of the new pipeline would address the issues which most commonly affect the rate of pipeline spills. The pipeline would be new and incorporate all modern safety standards including advanced pipeline coatings, cathodic corrosion protection, emergency flow control and shut-off valves, and include a new SCADA monitoring system with continuous monitoring provided from the EOF (see Appendix G for detailed description of safety features). These measures would directly address many of the historic causes of pipeline failure raised in past studies, particularly the CSFM study of California pipeline safety.

Further, internal inspection, required hydrostatic testing, and frequent pipeline corridor visual inspection by a line rider would further reduce the potential for undetected corrosion and third-party damage to the pipeline. Operator training and redundant safety systems would decrease the frequency of this already minor source of pipeline leaks. Finally, the pipeline would be in operation for approximately 12 years as it relates to production from the proposed Project (see Section 4.2.6 for analysis of cumulative pipeline safety issues). Because time of service is a key exposure variable in estimating spill risk, a defined operational time period limits the exposure to spills.

Mitigation Measures

None required.

Trucking Sub-Alternative

Under this sub-alternative, oil produced at PRC 421 would be transported by tanker trucks to a the ROSF, just east of Carpinteria where it could be transported to Los Angeles area refineries via a series of existing crude oil pipelines (see Figure 2-10).

Under this transportation option, an industry-standard truck-loading rack would be constructed at the EOF to accommodate the necessary truck loading requirements, which would include secondary containment and other features required by State, local, and Federal regulations. Existing crude oil storage tanks at the EOF would be used to store oil prior to loading.

An industry-standard truck-unloading rack including secondary containment and other features required by State, local, and Federal regulations would be required at the Venoco ROSF to transfer crude oil from the truck to an existing storage tank at the facility. The crude oil would be co-mingled with production from the Venoco Carpinteria Facility and transported via a series of existing pipelines to Los Angeles area refineries.

Each tandem truck would hold approximately 160 barrels of oil. Table 4.2-7 shows the number of truck trips that would be anticipated for each year of the Project. The total one-way distance traveled by each truck would be approximately 35 miles.

As described in the Draft EMT EIR, for which trucking was a project alternative, a number of studies have been conducted to address highway safety, truck accident rates, and spills of hazardous materials from truck transportation (Appendix C)

This analysis considers:

- Accident frequency based on total miles driven over a 12-year Project lifespan;
- Expected injury and fatality frequency, based on total miles driven; and
- Conditional probability of a release based on one-way miles (when a truck would have crude oil cargo).

Table 4.2-7 summarizes the distances used in the estimates.

Table 4.2-7. Truck Transportation Miles

Project Timeframe	Daily Truck Trips	Miles Traveled with Crude Oil Cargo (one-way miles)		Total Vehicle Miles (roundtrip)	
	(35-mile one-way distance)	Annual Miles	Total Miles	Annual Miles	Total Miles
Year 1	5	63,875	63,875	127,750	127,750
Year 2	4	51,100	51,100	102,200	102,200
Years 3-5	3	38,325	114,975	76,650	229,950
Years 6-9	2	25,550	102,200	51,100	204,400
Years 10-12	1	12,775	38,325	25,550	76,650
			370,475		740,950

The accident frequency rate used for this analysis was obtained from a study conducted for Santa Barbara County in 2004.[8] That study estimated an accident rate of 0.72 accidents per million miles. When applied to the total miles anticipated for the truck transportation option of the proposed Project, the proposed Project is anticipated to result in two types of safety impacts as follows.

[8] MRS 2004. See also CSLC 2006a.

Impact S-13: Potential for Release of Crude Oil from Truck Transportation

Truck Transportation of crude oil from the Project site to the ROSF could result from a trucking accident (Less than Significant, Class III).

For trucks carrying crude oil cargo, the anticipated frequency of an accident during the expected 12-year life of the Project would be 0.267. This rate, calculated using the accident rate from the 2004 Santa Barbara study and the total miles of truck travel (while carrying crude oil), equates to approximately 1 accident in 46 years involving a truck carrying crude oil. The low estimate is attributable to the short distance and the low number of daily number of trips, which commences at 5 trips per day during the first of the proposed Project, declines to 2 trips per day by year 6, and declines to 1 trip per day by year 10.

A range of conditional probabilities of spills from tank trucks was provided in the Draft EMT EIR. Conditional probabilities refer to the probability that a spill will occur if an accident occurs. In the Draft EMT EIR these conditional probabilities ranged from 2.6 to 35 percent (CSLC 2006a). Because far fewer than one accident is expected over the 12-year life of the Project for truck trips with crude oil cargo, no spills are expected, even if the most conservative probability (35 percent) is used. Therefore the Project would contribute a less than significant impact regarding an increase in the risk of spills from accidents related to the truck transportation option.

Mitigation Measures

None required.

Impact S-14: Human Injuries from Truck Transportation of Crude Oil

Truck transportation crude from the Project site to the ROSF could result up to 1 accident involving injuries over the 12 year project life (Significant and Unavoidable, Class I).

Truck accidents involving injury to the truck driver, other drivers, pedestrians, and private or public property would have the potential to occur whether the truck is carrying crude oil cargo or is empty. The anticipated number of accidents based on the total number of miles expected for the Project is estimated to be 0.53, which equates to one in 22.5 years. However, any potential injury-related accident would be considered significant. As such, the Project would create significant impacts regarding an increase in the risk of injury from accidents related to the truck transportation option.

Mitigation Measures

No MMs are available beyond standard regulatory measures to address this impact.

Rationale for Mitigation

None provided.

Residual Impact

The proposed Project would increase the probability of an injury causing accident and no feasible mitigation would be available to address this impact; therefore the impact would be unavoidable and significant (Class I).

4.2.6 Cumulative Projects Impact Analysis

This section summarizes other proposed or ongoing projects in an effort to assess whether the proposed Project's incremental impacts are cumulatively considerable. The cumulative projects are listed in Section 3.4.2, Description of Cumulative Projects, in Table 3-2. The potential for the Project to have impacts that are cumulatively considerable are related to oil spill risk, and therefore the marine transportation projects described in Section 3.4, Cumulative Related Future Projects, are the focus of this discussion because of their potential to increase the risks of oil spills affecting the same areas of coastline as the proposed Project, and/or to contribute to marine traffic, which is an underlying cause of marine accidents.

The Project would increase the amount of oil being transported by Line 96, and subsequently the EMT. This would marginally increase the potential for oil spills from the facilities (see Impacts S-5, S-6, S-8 and S-9). These impacts, which would fall within the range of the proposed projects potential impacts related to the use of the EMT for its permitted throughput, were evaluated earlier in this section and were determined to be Class II for spills from line 96, but Class I for spills from the EMT and Barge Jovalan.

Projects which could produce an increased risk of oil spill that could impact the same coastal areas as the proposed Project (inclusive of the barge routing) include the following:

- Cabrillo Port/BHP Billiton LNG International, Inc.;
- LNG Terminal at Platform Grace/Northern Star Natural Gas;

- Carpinteria Field Redevelopment Project/Carone Petroleum Corp. and Pacific Operators Offshore, Inc.;
- Paredon Project/Venoco;
- EMT EIR Lease Extension/Venoco;
- Ellwood Full Field Development/Venoco;
- Platform Grace/Venoco;
- Port of Long Beach Onshore LNG Terminal/Sound Energy Solutions;
- Marine Terminal Project, Port of Los Angeles/Pacific Energy;
- Channel Deepening Project/Port of Los Angeles;
- Artificial Reef, San Pedro Breakwater/Port of Los Angeles;
- John F. Baldwin Navigation Channel Project/San Francisco Bay; and
- Development of 36 non-producing Federal Leases/Various Applicants.

The proposed EMT lease renewal, Ellwood Full Field Development and PRC 421 projects are interrelated in that they would use overlapping facilities and could create similar impacts within the Ellwood area. In addition, if approved, the Ellwood Full Field proposal would share the proposed Gaviota pipeline with PRC 421 and both projects would contribute to the safety impacts associated with use of this pipeline. Use of the new Gaviota pipeline by the Ellwood Full Field project would substantially increase throughput in this pipeline and would almost certainly extend the life of the pipeline far beyond the approximately 12 year horizon anticipated for use by PRC 421. If approved, the Ellwood Full Field project is projected to produce approximately 8,000 barrels of oil per day during peak production. Although this combination of increased throughput and extended pipeline operational horizon could potentially increase safety hazards associated with a possible leak or spill from this pipeline, it is not possible to quantify this impact at this time. Further, the cumulative safety impacts associated with potential for a spill or leak from this pipeline would be substantially reduced by the same pipeline safety and operation measures which addressed project related impacts. This matter will be fully reviewed as part of the Ellwood Full Field EIR due to be released in 2007.

As described in the Draft EMT EIR, the LNG projects do not involve oil transportation, but the use of large tankers and support vessels introduces the risk of fuel spills into the marine environment because they have dual-fuel engines that use the boil-off LNG and

oil fuel. The Carpinteria Field Redevelopment, Paredon, and Full Field Development projects would involve increased offshore/nearshore drilling and associated crude oil transportation, which would increase the risks of oil spills into the environment. The Platform Grace project would not involve offshore movements of crude oil, but would increase vessel traffic and the risks of smaller spills of fuel from accidents (CSLC 2006a). All of these projects would exacerbate the potential oil spill risk of the proposed Project which has already been identified as Class I. Finally, although of low probability, possible collisions with LNG tankers would pose unique risk due to the highly flammable nature of that cargo.

Residential projects in the area would have no direct impact on the proposed Project risks. However, as noted in the Draft EMT EIR, some of the cumulative projects are residential developments near the vicinity of the EMT and Line 96 pipeline. These would increase the populations that could be exposed to a crude oil spill. Exposure would be both along the Line 96 route and in the recreational vicinity of the EMT and loading pipeline. Recreation would be expected to increase with the increase in populations living nearby (CSLC 2006a). As noted previously, although operation of the EMT has associated acute risks, the proposed Project does not contribute to the acute risks because of the low sulfur content of the crude oil produced at PRC 421.